400 Products Rated: Page 201 Kawasaki Saves IBM: Page 280

MACWORLD

THE MACINTOSH® MAGAZINE

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180c—Brilliant Color

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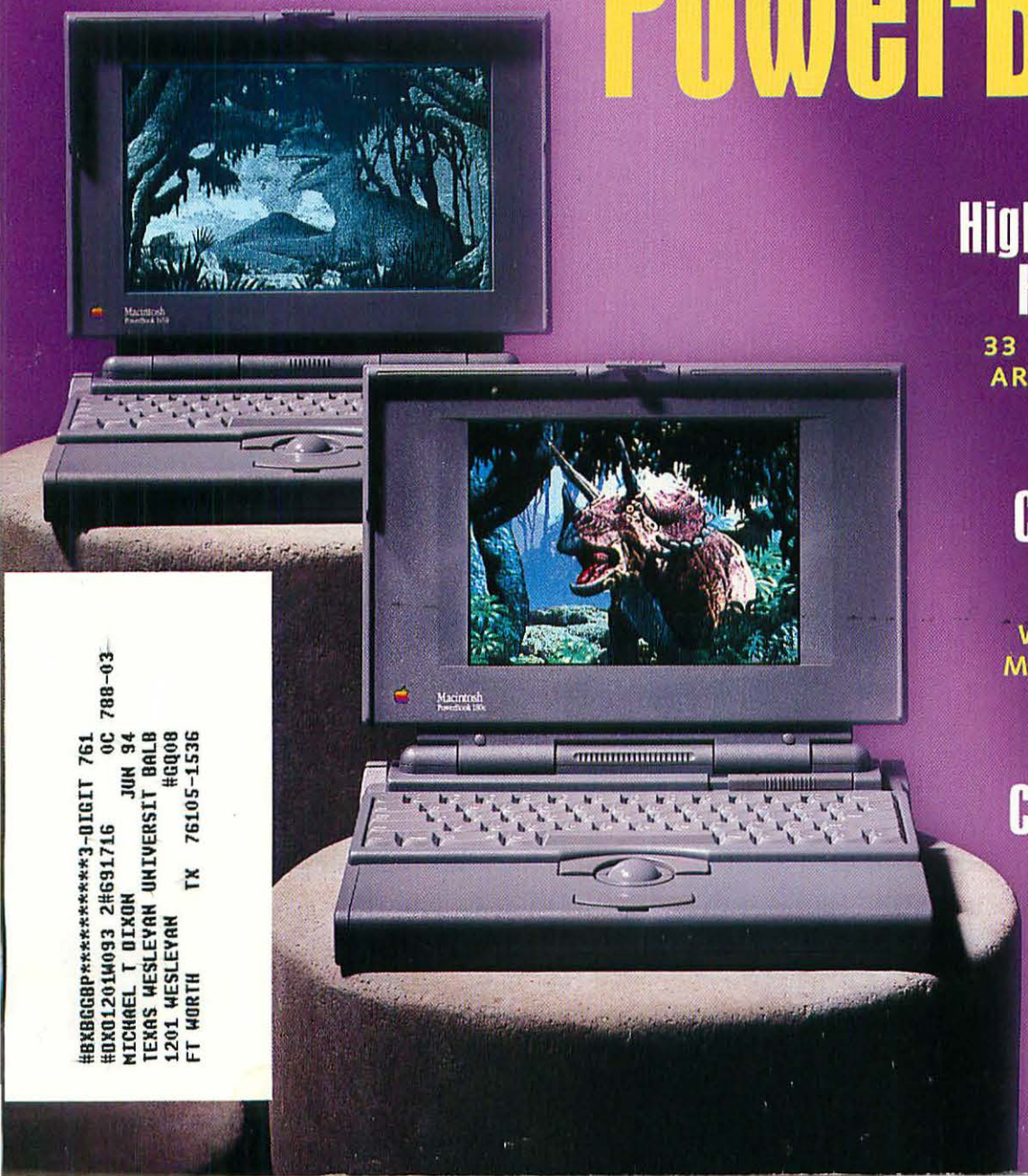

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WHICH TYPE OF MODELER TO BUY

Real-Time Compression

ITS PROMISE AND PERILS

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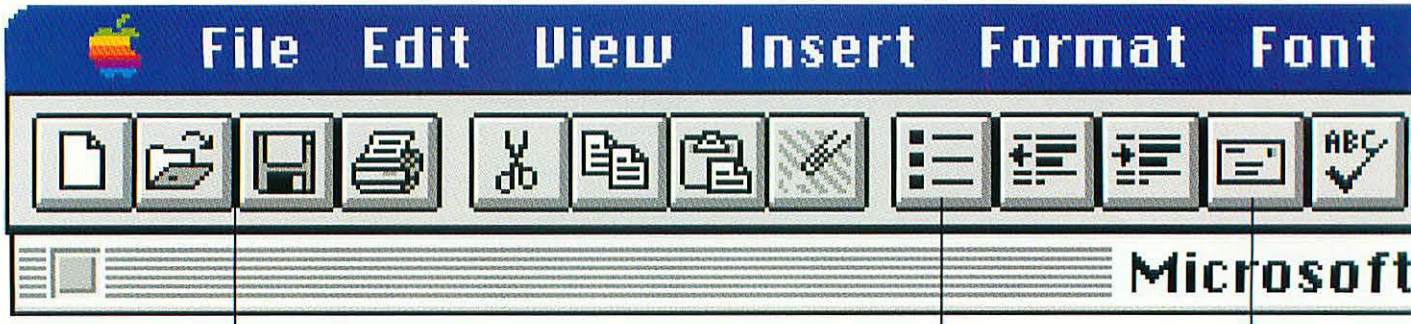

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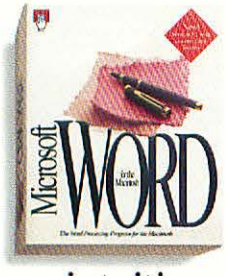

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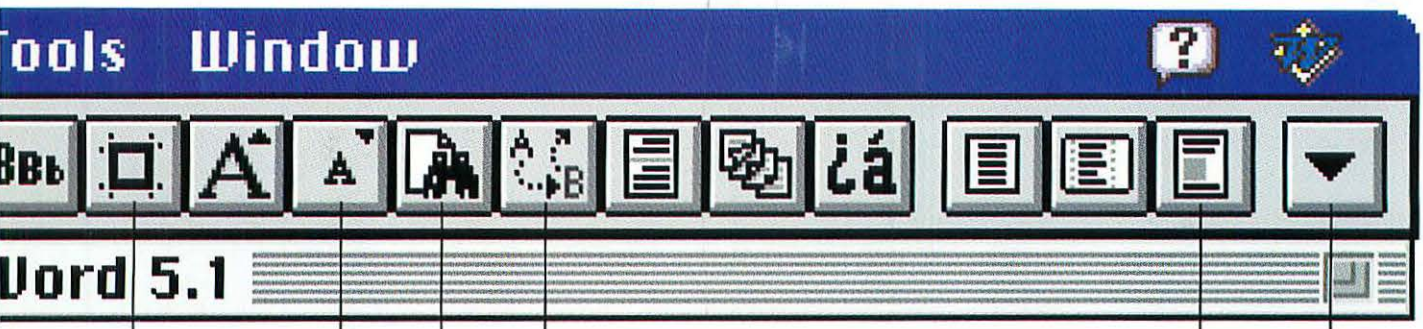

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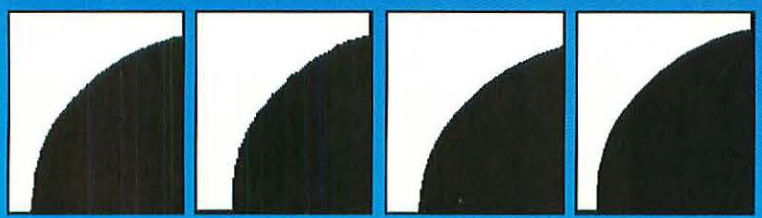

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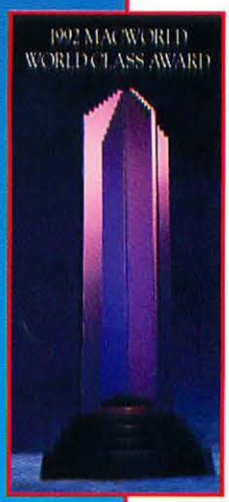

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INTRODUCING TWO NEW POWERBOOKS: THE 180c SPORTS HIGH-QUALITY COLOR; THE 145B BECOMES THE LOW-COST LEADER, P. 86. (PHOTO BY PAUL FRANZ-MOORE; SCREEN IMAGE FROM HELL CAB, A WARNER NEW MEDIA CD-ROM GAME.)

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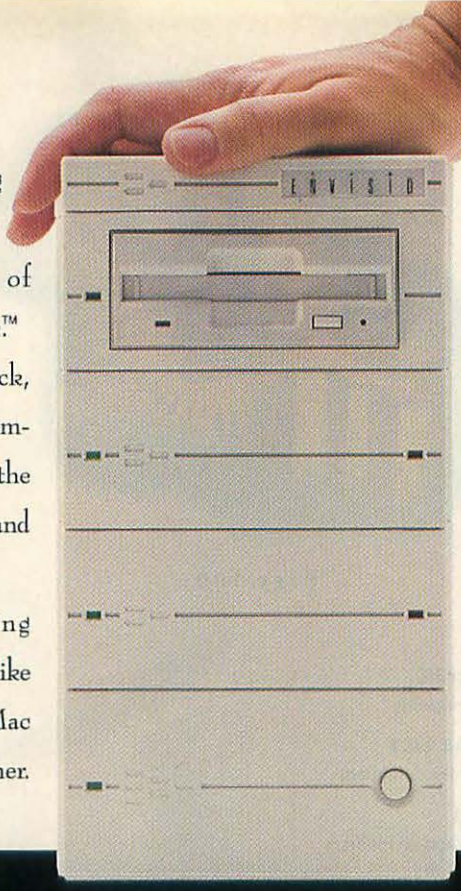

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Just Like Legos® With SmartStack, adding more storage is as easy as assembling building blocks. ▪ Just pop off the top, snap on another SmartModule, and replace the top.

Untangle Your Life Connecting multiple SCSI devices used to be like black magic; what worked on one Mac wouldn't necessarily work on another. • Which is why Envisio created SmartStack's patented Pass-Through-Bus.™ ▲ With SmartStack, there's just one SCSI cable and one power cord for up to seven devices; just snap them together, and you're ready to work. • All the connections are made internally, and automatically. SmartStack's active termination takes the mystery out of configuring your SCSI chain; no more remembering arcane rules and their exceptions. SmartStack takes care of it for you.

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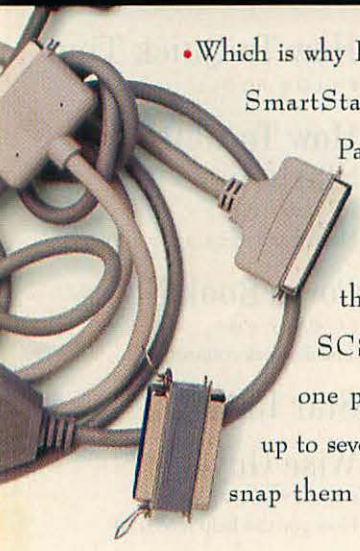

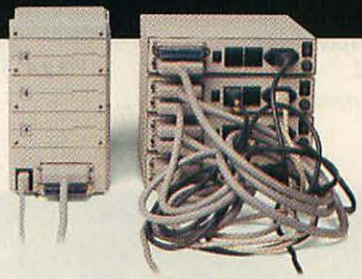

Eliminate cable tangle and trouble with SmartStack.

SmartStack is available at SmartDealers™ everywhere, including CompUSA, MacConnection, MacWarehouse, and MacZone.

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QuickTime Savvy

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Introducing the world's first QuickTime-savvy color scanners.

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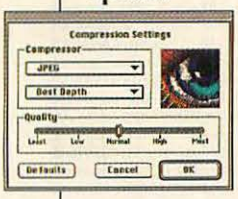

*By using QuickTime's JPEG compression, images scanned on your new Mirror scanner can be saved at 1/50th their normal file size!** Images that used to fill up a $75 cartridge can now fit on a diskette that costs under a buck.*

Total Control with MirrorScan™

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Mirror Scanner from **$1099** with Photoshop

Choose 600 or 800 dpi

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Mirror Scanners	600 dpi	800 dpi
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All Mirror products include lifetime technical support and are backed by our 30-day "love it or return it" satisfaction guarantee.

[1]April 1992, [2]July 1992, *Requires an available NuBus slot. **Compression ratios vary, depending on quality settings. All prices subject to change. Prices are for US orders only, call for international pricing. © 1993 Mirror Technologies.

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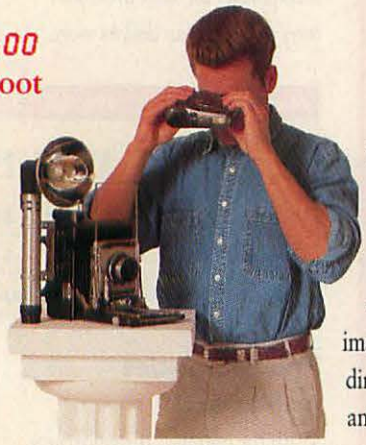

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10:45
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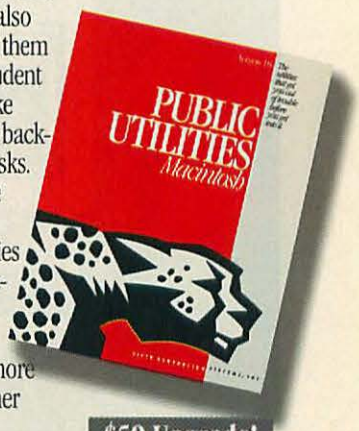

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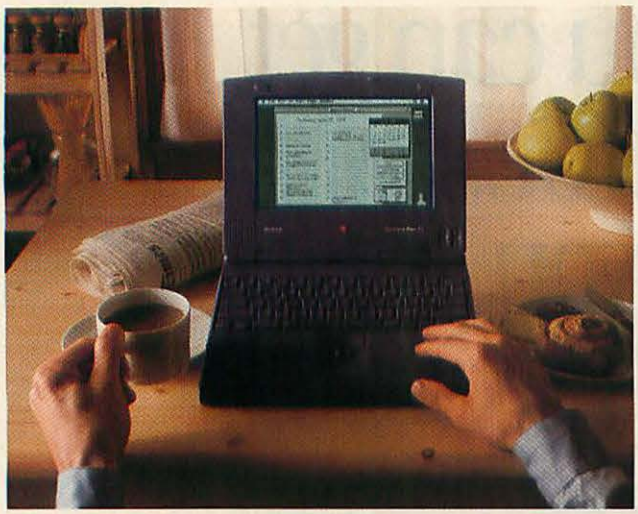
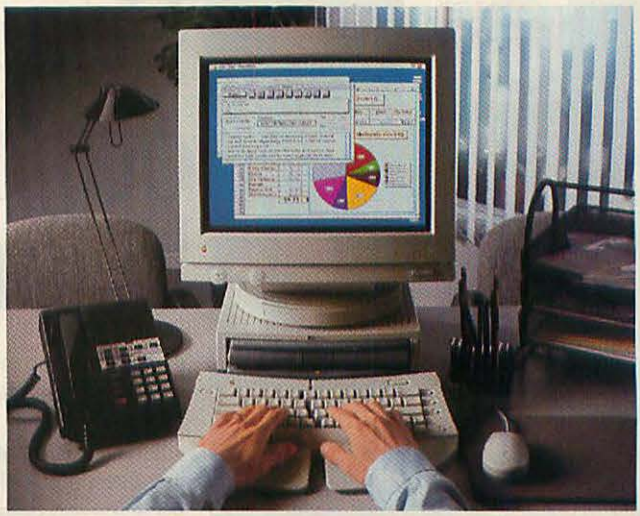
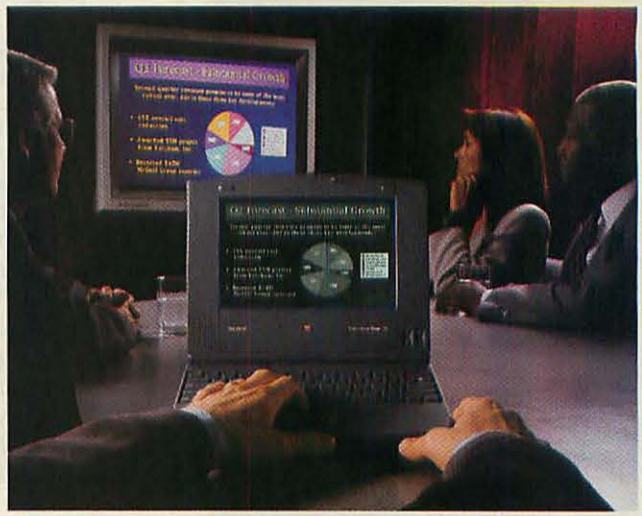


8:00 Home *Over breakfast, you check your calendar on your PowerBook Duo. The day looks like it'll be a breeze. You'll put a few finishing touches on the Q2 forecast presentation that's due in a few days, return some calls and have a free afternoon.*



9:15 Your Office *You slide your PowerBook Duo into the Duo Dock and start working. Suddenly, e-mail chimes. Your boss wants you on the noon shuttle to Boston, to present the Q2 forecast to* his boss. *Also, a client wants to see you ASAP. You hit the eject button.*

2:50 Borrowed Office *A colleague is at lunch, so you borrow his Duo Dock. You log onto e-mail back at the home office and learn your group has just won a new account. You put this news into your presentation (and change a few colors, too).*



3:30 Conference Room *You clip on the Duo MiniDock and run the presentation from your PowerBook Duo. Everyone's impressed—especially the guy who asks a series of questions about a six-month-old project. You've got your files, so you've got the answers.*

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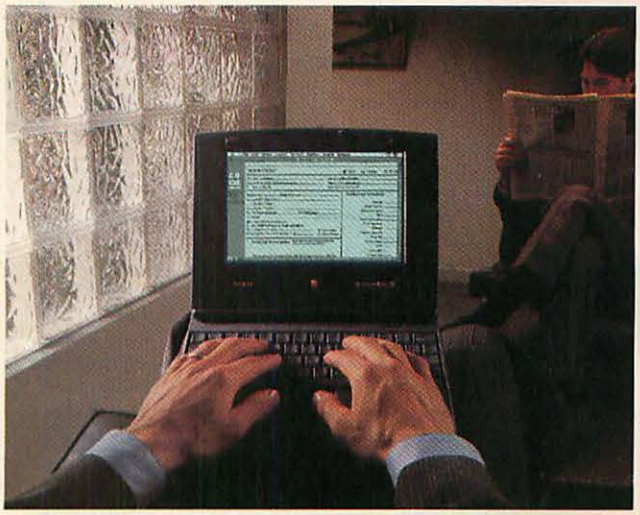
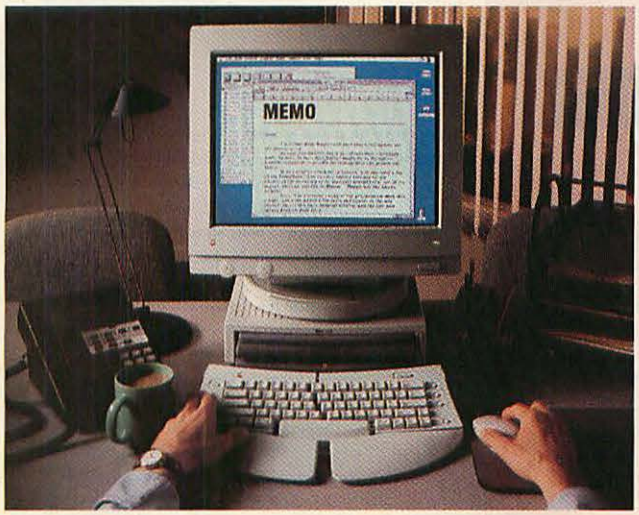


11:10 Your Client's Office *That $5 million project the client told you was off last week? It's on again. And due in two weeks. You type up job orders, which you'll fax from your PowerBook when you get to Boston. Now, however, you have to get to the airport.*

12:40 Noon Shuttle *All the files and software you use at your desktop are with you. You pull up the Q2 presentation and make the revisions to reflect the new assignment. Then you write a memo to your team, to make sure that everything's on schedule.*



7:00 Your Office *On the way home, you swing by the office to tie up a few loose ends. You see your boss. He heard the meeting went well, and wants you to fly out and present to the people in London. Tomorrow. You send out a memo to update your staff.*

8:30 Living Room *Since you've got all your files and software right there with you, you could study the new research data or finish up those performance reviews. But hey, enough is enough. You settle back in your recliner and play a few rounds of Tetris.*

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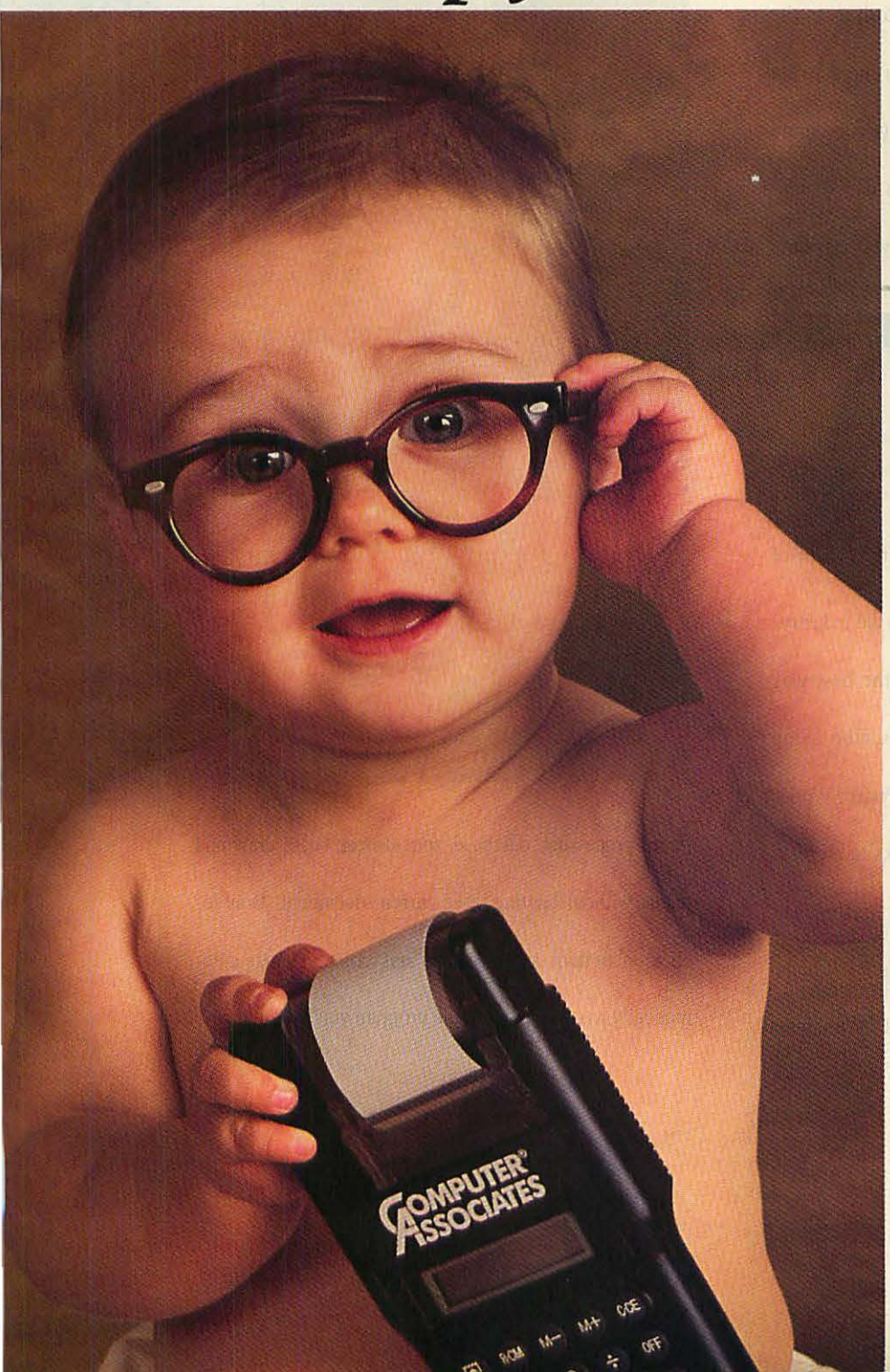

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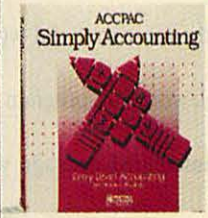

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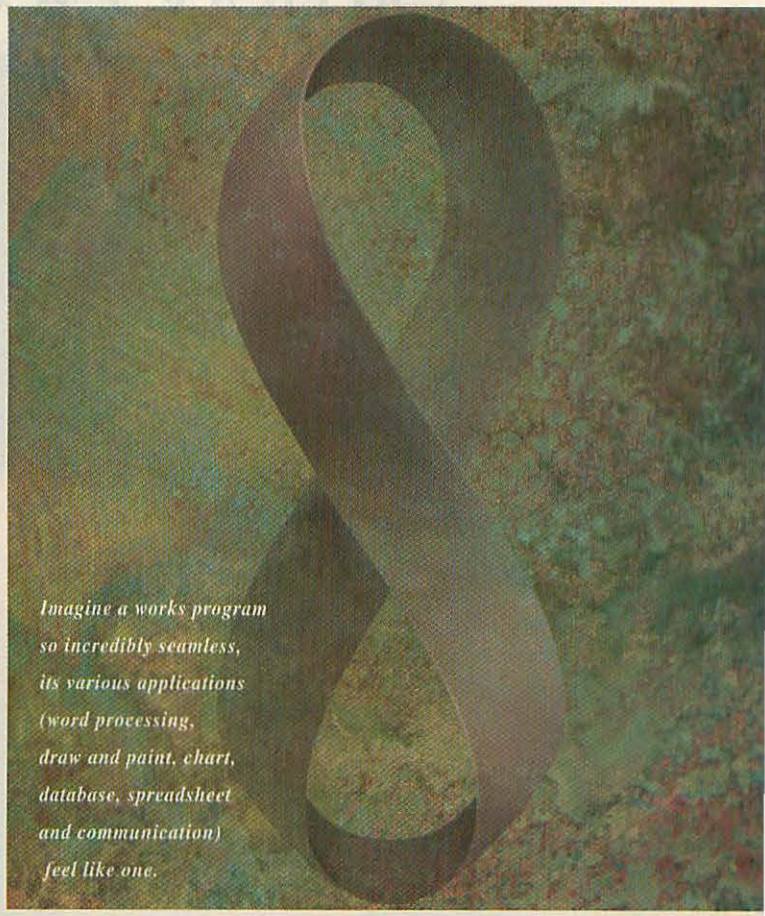

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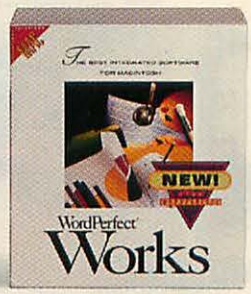

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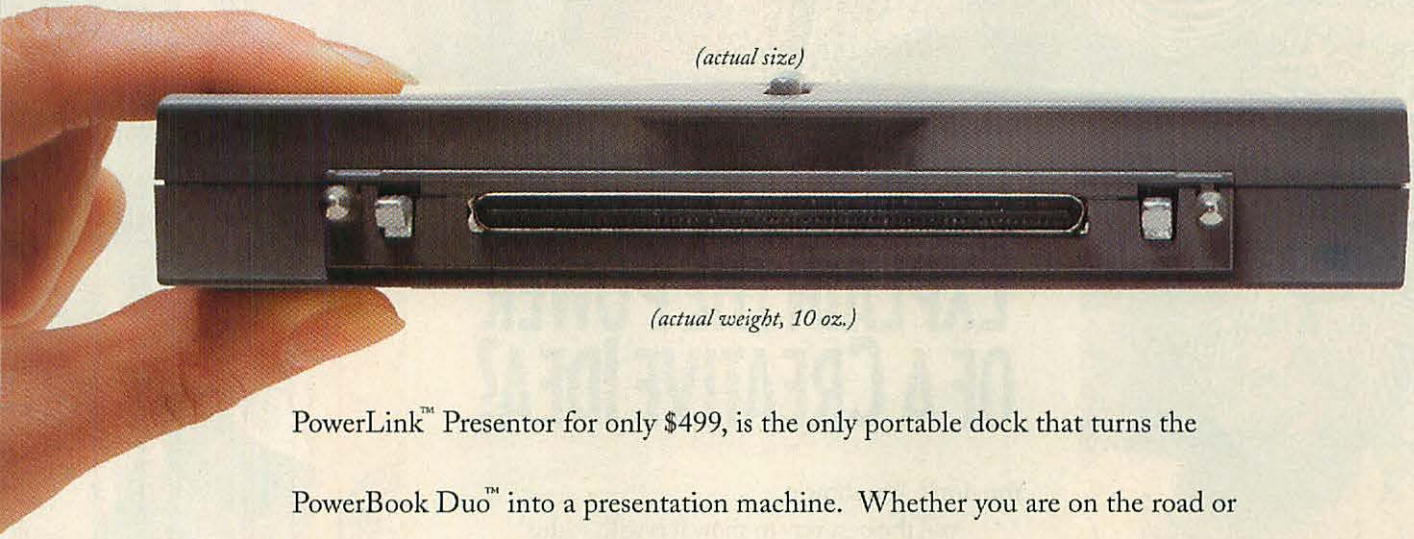

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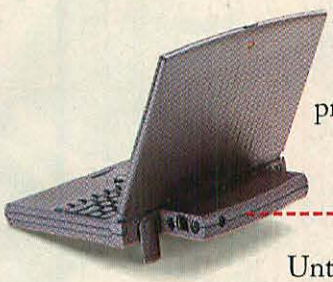

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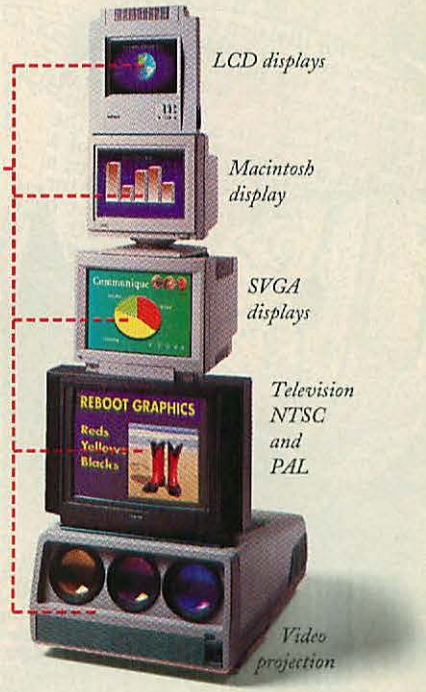

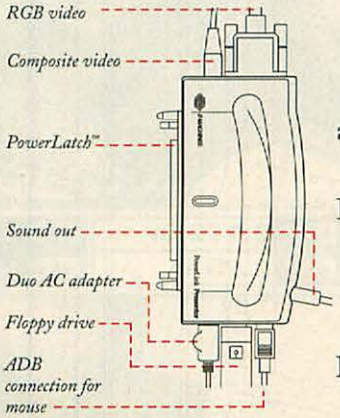

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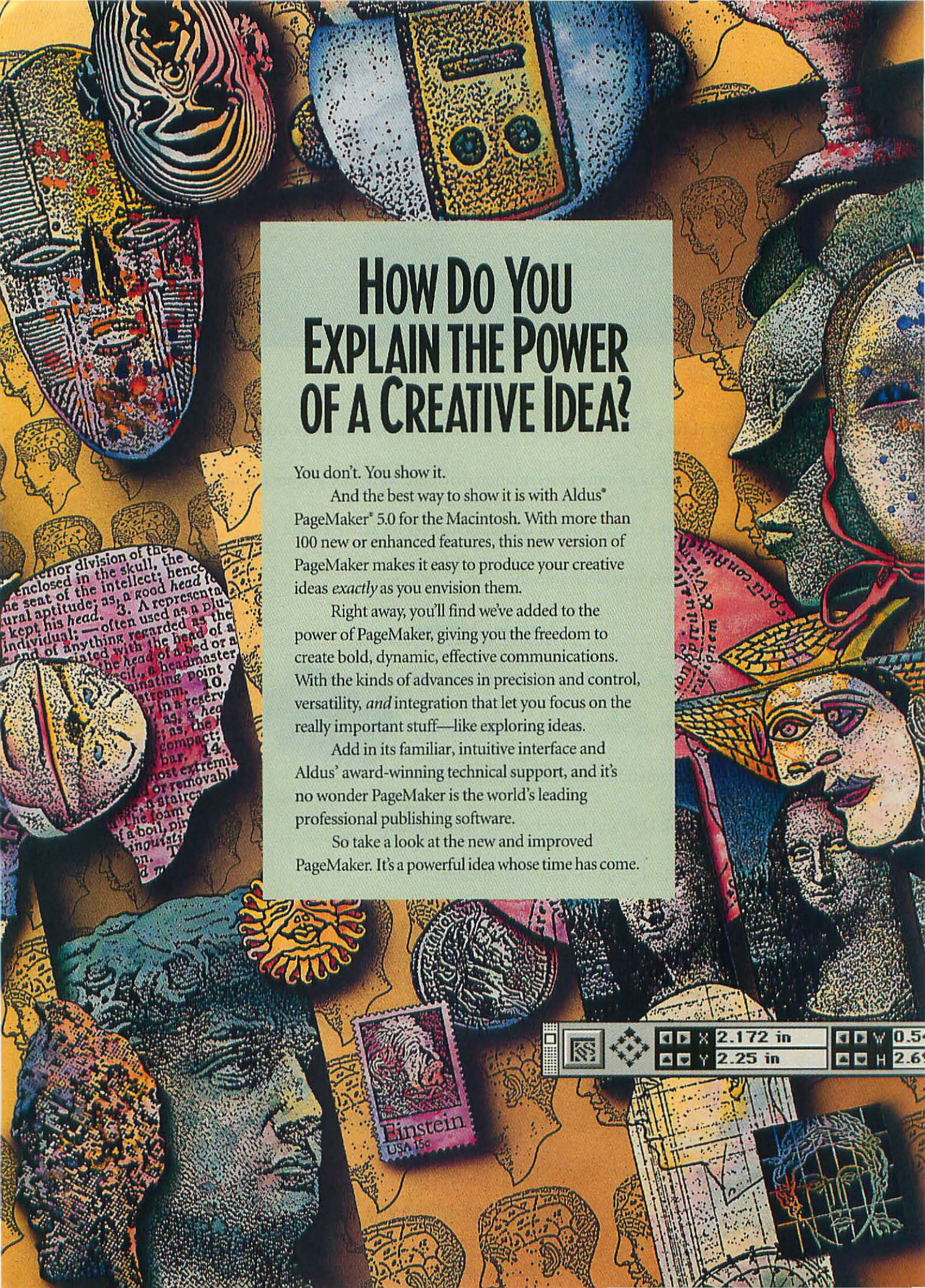
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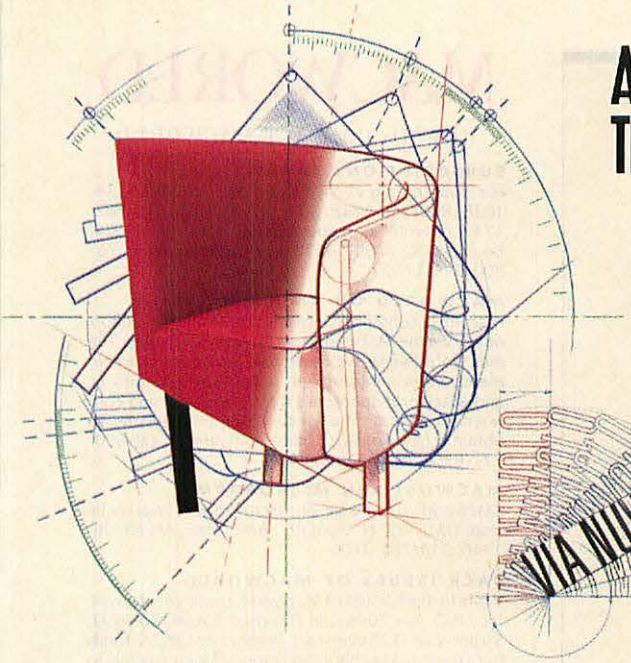

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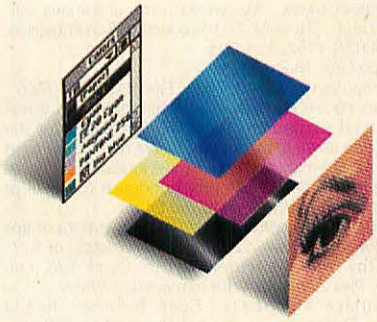

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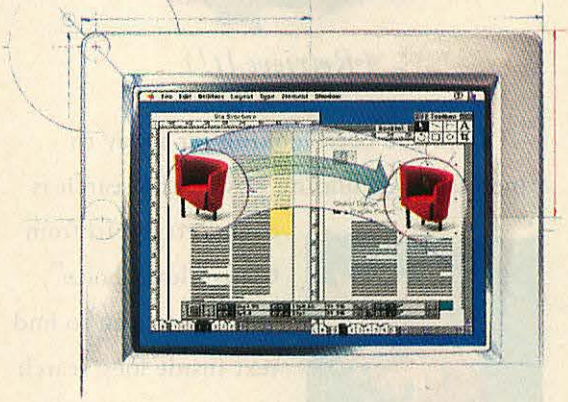

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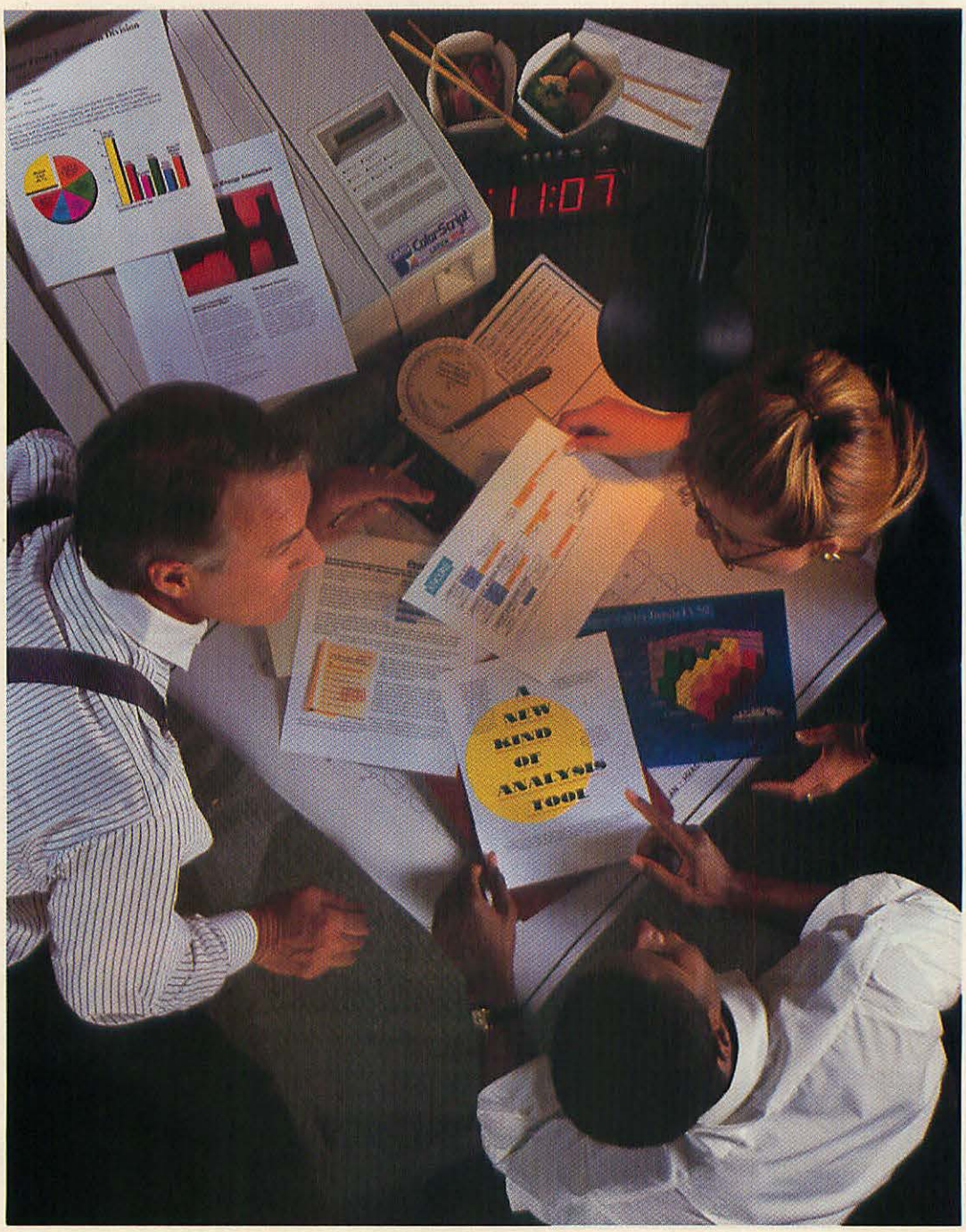
Cindy Smith plays with color.



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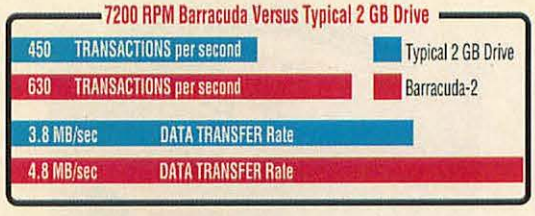

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MacBulletin

LATE-BREAKING NEWS

Apple to Make SIMMs? As users continue to have problems with many third-party composite SIMMs for the Quadra 800, the Centris 610 and 650, and the LC III (see *MacBulletin,* June 1993), Apple is considering putting high-capacity SIMMs on the list of products it offers for sale, according to a company representative.

Forever Amber: Apple recently disclosed it is developing Amber, a new document-centered software architecture. Under Amber, users will never have to leave the document they are working on to add or manipulate graphics, edit text, repaginate, and so on; instead they will access the functions of related applications without switching into those applications.

PowerPC Powering Up: Apple wowed the crowds at its Worldwide Developers Conference by demonstrating a prototype PowerPC RISC system running Macintosh applications. Almost as important for Mac owners, though, Apple also announced that it intends to offer PowerPC upgrade paths for the Mac IIvx and IIvi, Centris 610 and 650, Performa 600, and Quadra 800 systems. Both IBM and Motorola have announced preliminary shipments of PowerPC 601 microprocessors, and several major software companies (including Adobe, Claris, and Microsoft) announced at WWDC that they are writing PowerPC applications. Apple said it plans to have PowerPC machines ready in the first half of 1994.

New Print Driver Is Mixed Blessing: According to Apple's own documentation, the LaserWriter 8.0 driver (codeveloped with Adobe, which is selling it as PSPrinter 8.0) can cause printing and PostScript problems with many older, and some newer, applications. Also, despite both companies' statements that their versions are functionally identical, Adobe's documentation details additional problems with applications from over 20 vendors (including Microsoft, Claris, and Aldus), which Apple doesn't mention. Apple says that it is looking into the documentation differences.

Apple Slices Printer Prices: The retail price for the Apple Color Printer dropped from $2349 to $1659, and the Apple Personal LaserWriter NTR went from $1649 to $1179.

Airlines Shut Down PowerBooks: If you use your PowerBook on an airplane, chances are you'll be asked to put it away at least twice during your flight. American, Northwest, Continental, TWA, JAL, and USAir all have policies in place restricting the use of personal electronic devices during takeoff and landing, and other airlines are openly considering changing their rules, based on well-publicized anecdotal evidence from pilots and an old FAA study indicating that electronic devices can interfere with cockpit systems.

Self-Teaching Agent: Open Sesame, from Charles River Analytics (617/491-3474), is a software program that will take over routine computing tasks. Unlike No Hands' Magnet (see "Automating the Finder," *News,* July 1992), Open Sesame can analyze what you do on your Mac and pops up with an offer to do it for you. Open Sesame will list for $99 or less and should begin shipping in late summer. m

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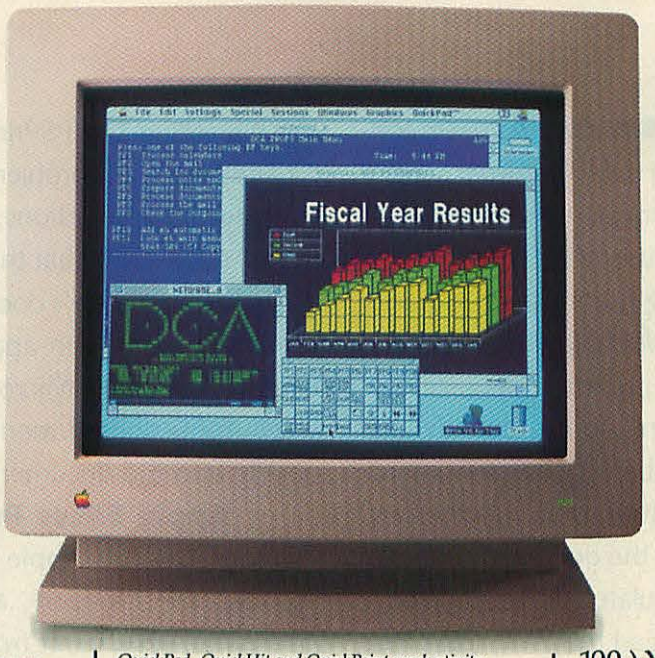

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Name That Macintosh

BY ADRIAN MELLO

THERE'S A GRAVE CRISIS IN the former orchards of Cupertino. Despite its best intentions, Apple seems unable to rise to a critical challenge that, if not overcome, may doom the company. The crisis? It's Apple's product names.

This month Apple continues its never-ending product rollout with two more PowerBooks, the color active matrix PowerBook 180c and the low-cost PowerBook 145B—both previewed in this issue. That means there are now seven PowerBooks—more than the total models in the entire Mac line just three or four years ago. At the rate the elves at Apple are popping out new Macs, there will be several hundred models by the year 2000.

How is Apple helping us keep track? Well, it has come up with a brilliant naming scheme that combines the way Mercedes-Benz and BMW name cars with the way Sylvester Stallone names movies. I would be pretending if I said I knew where Apple got its inspiration for naming Macs. However, I have a theory: these names come from an elite group of subgeniuses who make a bushelful of money for sitting around dreaming up product names. You can imagine these marketing poets seated in a tinted-glass conference room with white acoustic tile (come to think of it, maybe this is the inspiration for those little air holes in the front of the new Macs), in a pastoral industrial campus in Cupertino.

The truth is that without really understanding the meaning behind model names, we're forced to speculate. This follows in the tradition of other great ambiguous systems such as alchemy, numerology, palm reading, and Beatles albums (on that last subject, some hackers tell me that if you play one of the Macintosh system sounds backward it will say "Steve is dead"). I suspect there is some hidden meaning behind the Mac monikers. I for one am determined to get to the bottom of it. Perhaps we'll discover a new definition for the term *fuzzy logic.*

The Golden Delicious 205

IF APPLE HAD STUCK TO APPLE-RELATED names, perhaps there'd be no problem. A Macintosh, after all, is named after a variety of apple. I think there was a lot of potential in this idea, and Apple could have cultivated a virtual orchard of product names. What about the Golden Delicious 205, the Granny Smith II, or the Fuji 900zx? There are approximately 5000 varieties of apples, so Apple would face no danger of running out of names.

With this in mind, it's promising to see Apple working on the Newton. Apple's first logo was Sir Isaac under an apple tree, presumably about to get bopped. Following the Newton example, Apple could branch out into product lines named for historical figures known for their relationship with apples. Someday you might prepare a letter or a presentation on a Johnny Appleseed 180c, a William Tell III, or an Eve Plus. Instead Apple is using names that sound like a cross between fancy cars and Roman tyrants.

The Numbers Game

FOR SEVERAL YEARS YOU COULD count on Apple to christen new models with Roman numerals and the occasional letter. This all started with the Apple II, the Apple IIc, the IIe, and the IIGS. The company carried this scheme over to the Mac II, the Classic II, and the LC II. Someone once said that after the ill-fated Apple III (a chip would sometimes spontaneously leap out of the main system board!), the company would never again use the Roman numeral III. Well, the LC III proves that theory wrong. I've already heard some people in the industry speculating that the impending, next-generation PowerPC-based Mac will be referred to as the Mac III. As majestic as Roman numerals are, you run into problems with big numbers. We've all seen those long impenetrable copyright dates trailing the end of movies—you know, MCMLXXXIV. Can you imagine the Centris CXIV or the Quadra CLIX?

Apple still uses Roman numerals, but the company wanted more freedom. Have you ever noticed that if you look at Roman numerals too long they begin to look an awful lot like letters? Perhaps one day, after a particularly brutal brainstorming session, the marketing poets noticed the same thing. This might explain the lettering on the Mac II line including the IIx, IIcx, IIci, IIfx, IIsi, IIvx, and, overseas, the IIvi. For a long time, Mac owners tried to figure out what these letters stood for. I've never solved it, but a source told me that this naming arrangement was the sinister work of Mister Mxyzptlk, an enemy of Superman who could be defeated only by being tricked into saying his name backwards. Now I don't know a lot about this guy, but you can pretty much figure out two things from his name: (1) he didn't like vowels; and (2) he didn't win too many spelling bees as a child.

Even this naming arrangement ran out of steam a couple of years ago when Apple really kicked into product overdrive. The marketing poets must have known that they were going to run into problems with the big Roman numerals and run out of two-letter combinations. I imagine one of them driving in to work one day, trying to figure out which brand-new German luxury car to buy this year. It was a tough call, but it came down to one of the BMW models, such as the 850i, 750il, or the 535i, or a Mercedes-Benz 500SL or 300CE. That's when it hit home—Macs could have meaningless combinations of three-digit numbers for names just like the big toys. That's how we got the Performa 200, 400, 405, 430, 450, and 600; the Centris 610 and 650; the Quadra 700, 800, 900, and 950; the PowerBook 100, 140, 145, 160, 170, and 180; and so on. My outmoded carbon-based brain tells me a bigger number is supposed to be better within each of the product lines, but beyond that I'm stumped.

The Macintosh Naming Contest IIcxgl

The scariest development yet is that combinations of numbers and letters are coming back: the 145B, 165c, 180c. Now I ask you, why is the *B* capitalized, while the *c* is not? Whatever the reason, my guess is that as models proliferate we can expect to see more alphanumeric combinations. If only Apple would use names that mean something,

continues

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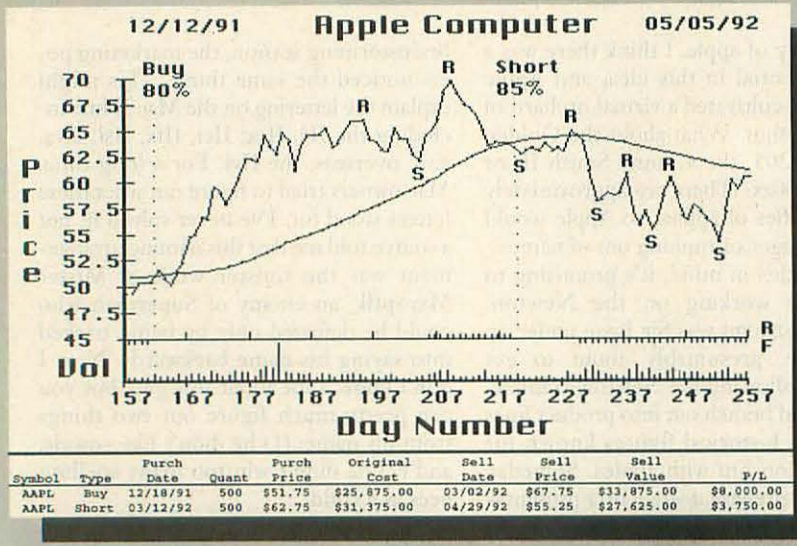

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even if just in vanity-plate speak. You know, TOTE MAC for one of the Duos, or 040 POWR for the Centris 650, or maybe even LUV MY MC for one of the Performas. Perhaps the naming scheme should be more grand and mythological—in the tradition of ancient Greek epithets such as Storm-Gatherer or Fire-Giver. The epithet scheme led to the one good name in the Mac line, the PowerBook. It actually tells you something about the system in question. Hmm. Scratch one marketing poet, who's now unemployed.

Latin Tech Talk

THE LATEST DEVELOPMENT IN MACintosh product names is the use of Latin-sounding words—Duo, Quadra, Centris—that seem both mysterious and technical at the same time. Quadra basically means four. Intel, which is doing pretty well these days, seems to have logged on to the same vibes as Apple's marketing poets; the semiconductor company recently named its latest microprocessor Pentium, which roughly translates to "the fifth." My guess is that Centris is not really another name for "one hundred"—that's just a bonus. Centris is meant to imply the center—or midrange—of the Macintosh product line. Pretty clever, huh? This word is also part of the recent wave of company and product names that are mysterious-sounding words that end in *is* or *us*, like Aldus, Claris, Nexus, and Lexus. If Apple continues in this direction we might end up with the Septius 700, the Quo Vadis IV, or the Extremis lx.

Code Names

SOME OF APPLE'S CODE NAMES HAVE been much more interesting than the final names. Once upon a time there were Macs called Paris, Cabernet, Chablis, and Bobcat, before they were cast out onto dealers' shelves. System software and applications continue to have even more interesting code names—Pink, Amber, Casper, Bedrock, WildCard. Some of the best names even make it out into the light of day, like QuickDraw and QuickTime.

If you can figure out any meaningful system behind all of the Mac names and numbers, I'll send you a small cash prize. And I'm sincere when I say small. Also, you can help curtail the Apple product-naming crisis by entering your own scheme in our Macintosh Naming Contest IIcxgl. If you think of any better suggestions for Mac product names, please send them to me, and perhaps I'll publish the best ones. I sure could use any help you might offer, since I'm applying for a job as a marketing poet at Apple, and I've already got my eye on a German luxury car sporting a three-digit number. **m**

Letters

AUGUST 1993

DigitalFilm Follies

THANKS TO DEBORAH BRANSCUM for exposing SuperMac's lack of R & D on their DigitalFilm product (*Conspicuous Consumer*, May 1993). What amazes me is that SuperMac's president, Mike McConnell, blames the inexperience of the user for the complaints that they have received. As an aircraft engineering friend of mine put it, "We don't get the luxury of blaming the passengers when one of our engines malfunctions. Why should they get away with blaming the end user for their engineering problems?"

Brian Michael Ross
via America Online

Sex Sells

DAVID HERSCHMAN REALIZES, quite correctly, what many people still don't believe: sexually oriented entertainment has become mainstream (*The Iconoclast*, June 1993). Heck, the number-one movie in the country is all about a woman who commits adultery for a quick million.

The fear of sexually transmitted diseases is making virtual sex a popular alternative to the real thing. People working in multimedia and virtual reality are poised to take advantage of this trend, and will certainly make a pile of money from it.

Will Cate
via CompuServe

THANK YOU, STEVEN LEVY, FOR ATTempting to deal with the problem of computer pornography. Your column, however, was too easy on this hard-core software.

Explicit sexual multimedia is offensive. It turns women into sexual playthings and makes men out to be lust-filled animals controlled by their hormones. Those who produce this perversion do so for profit—smut dealers never think about the negative effects on the public. People like David Herschman should not be free to contribute to the moral decline of our nation with their prurient products.

Gary Karwoski
Warroad, Minnesota

STEVEN LEVY'S PRUDISH DIATRIBE is replete with irrational prejudice. For example, images of naked human beings created by Italian Renaissance painters are acceptable, but similar images produced by people with cameras are not. By this twisted logic, if Botticelli had a video camera instead of a paintbrush, he would have been a pornographer.

Virgil Haxton
San Diego, California

I WAS SEVERELY DISAPPOINTED THAT booth space at the San Francisco Macworld Expo was sold to pornographic software vendors.

The law defines sexual harassment in part as conduct of a sexual nature which creates an offensive or hostile work environment. Many women attended the Expo in a professional capacity, the majority of whom I'm sure were uncomfortable with the items on open display at several of these booths. What about the women who worked in adjacent booths? How do you think they felt about listening to the comments of male porno patrons for four days?

James Moratto
Santa Rosa, California

I READ MR. LEVY'S COLUMN WITH some irritation and some amusement. The fact that you don't like these people's products doesn't give you the right to call them "sleaze merchants."

I myself have no use for violent arcade games, so I don't play them. I don't write personal attacks on their creators, complete with comments about what their mothers might think.

Deirdré Straughan
Milan, Italy

continues

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CORRECTIONS

In the March 1993 feature "First-Time Authoring," Passport Producer should have been identified as supporting PostScript font scaling via ATM.

In the May 1993 MacBulletin, *we incorrectly stated that eDisk requires that you reformat your hard drive on installation.*

In the May 1993 feature "Here's Looking at Monochrome Monitors," the correct price for the 8-bit Radius Pivot Display video board is $550, not $299.

In the May 1993 feature "Dye-Sublimation," the 3M Rainbow should have been given a "not tested" rating for technical support, and an "NA/NA" rating for RAM configuration. In the same feature, the following two sentences should have appeared in the sidebar "How Fast Are the Dye-Sublimation Printers?": We used a Mac IIci with an Apple Cache Card and 8MB of RAM for our testing. The 3M machine should perform faster when running from a higher-end Mac, and also if letter-size paper is used.

In the June 1993 review of MathCAD 3.1, the University of Waterloo was incorrectly identified as being in Iowa. The correct location is Ontario, Canada.

In the June Desktop Critic, *the GCC WriteMove II's serial cable is 32 inches long, not 6 inches.*

In the chart "System Upgrades" ("Upgrading Your Mac," June 1993), we indicated that the Centris 610's processor runs at 25MHz, and the Centris 650's at 33MHz. The speeds should have been 20MHz and 25MHz, respectively. Also in that chart, the IIvx has three NuBus slots, not two. Finally, all info-art photography for the June issue was done by Luis Delgado.

Guy Kawasaki Fan Club, Et Alia

DEAR *MACWORLD* MAGAZINE, _____ [A warm welcome to/ Pleased to see/My mind was changed when I saw/I applaud/My sanity was saved by/How very welcome to see/Thank you, thank you, thank you for adding] Guy Kawasaki.

Guy is a _____ [lively/witty/philosophical/well-respected/witty/with-it/hu-

continues

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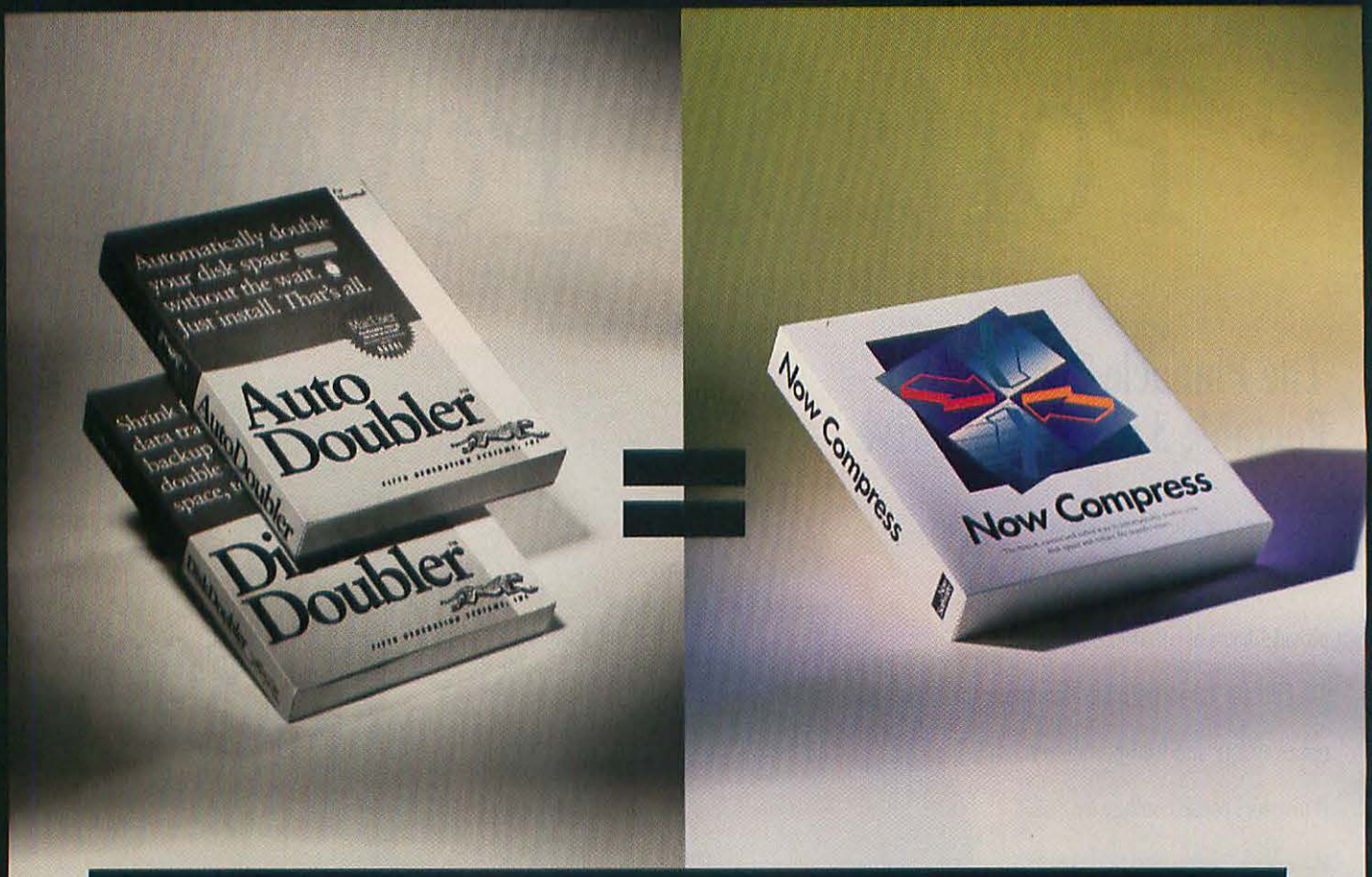

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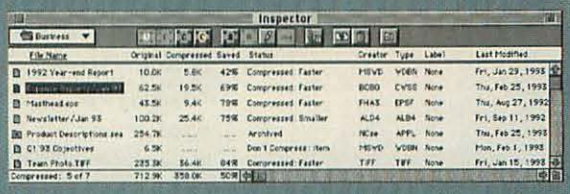

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morous/witty/trusted/insightful/refreshing/entertaining/world-class/witty/thought-provoking/witty] columnist.

_____ [I look forward to *Macworld* even more/I used to read *Macworld* from beginning to end—now it'll be the other way around/A very large chunk of the Mac magic is on *Macworld*'s final page/*Macworld* is the computer magazine with real soul food/Hooray for *Macworld*/I'm renewing my subscription].

Fans o' Guy
via America Online, CompuServe, Internet, fax, and USPS

GUY KAWASAKI DEMONSTRATES the take-it-or-leave-it attitude that just about destroyed Apple under Jobs and company. When Guy was employed at Apple, there were only three models of Macs and the entry price was $2000. This must have been his idea of the computer for the rest of us.

James Earl
Marshall, Michigan

IF THE BEST USE THE KAWASAKImeister has for a PowerBook is travel, let him read and learn (*Wise Guy*, June 1993).

You buy a PowerBook so that when your customers call you at home, you can grab the machine off your bed, bring up their file, and solve their problem while making small talk.

When a "Star Trek: The Next Generation" rerun comes on, you check your HyperCard stack and find out that you've got that episode on tape already. In the kitchen, you work from your electronic copy of the recipe for Cajun gumbo, which includes notes from previous preparations. After dinner, you check your Remember file to find out what's coming up for tomorrow.

Finally, as you're dropping off to sleep, a great letter to *Macworld* pops into your head. You grab the PowerBook in the dark, wake it up (nobody ever turns a PowerBook off), and jot a few notes. You could finish it up, plug in the phone cord, and send it right away, but you decide to wait and see if the subject looks different in the daylight.

That's the way to use a PowerBook.

Martin B. Tittle
Ann Arbor, Michigan

I WAS NOT AMUSED BY MR. KAWAsaki's June column. Specifically, ". . . their round eyes glaze over and their Protestant brains . . ."; why in the world did *Macworld* print such racist and prejudicial nonsense? I suppose that next you will print "squint-eyed Buddha brains" to describe the Asian computer executive establishment.

Jeff Frank
Hawthorne, California

TALK ABOUT YOUR MIDDLE-AMERIcan, starch-white, my-way-or-the-highway attitudes—what's all the hostility for, Guy? Did someone steal your wallet in Shinjuku? Here's some advice for the man who can't imagine ever asking for any: keep your racial slurs to yourself, bub.

David Rowe
via America Online

Play It Again, Sam

I WAS IMPRESSED WITH THE MOVIE theme for "Here's Looking at Monochrome Monitors" (May 1993). I have considered attempting similar themes, but I was leery of copyright legalities.

I could find no credits or studio/producer/actor acknowledgments anywhere in the magazine. Can you tell me

continues

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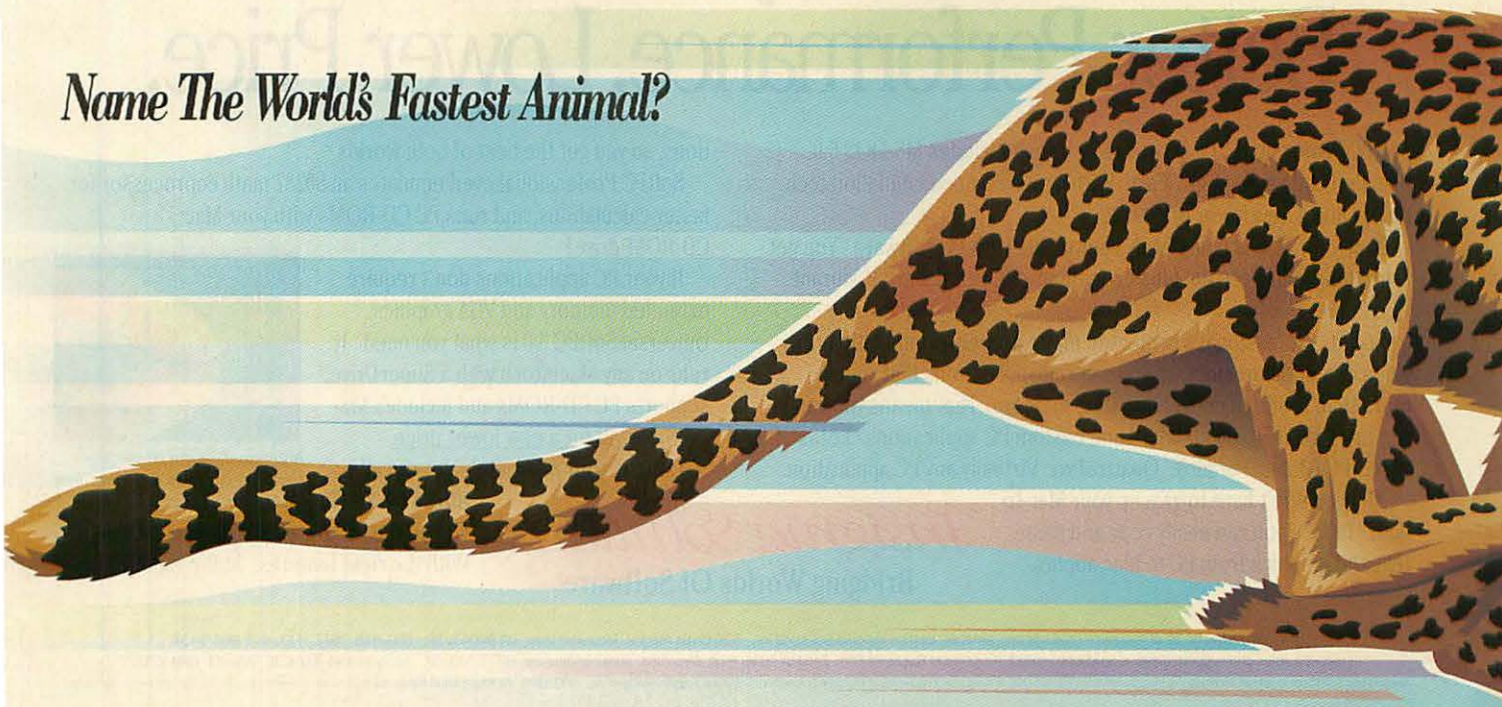

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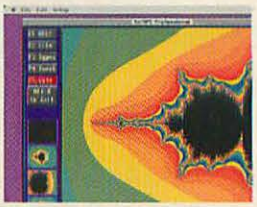

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how to legally use such images in my own graphic works?

Paula Morris
Zanesville, Ohio

You haven't been opening your *Macworld* forcefully enough. We ran a copyright notice twice—once on page 5 and once on page 113. But it's on the far left side and hard to see unless you crack the spine. Most studios allow magazines to use still images from movies—pricing is usually determined by the popularity of the movie (or actor) and the size of the proposed project.—Ed.

Network Inaccuracies

THERE ARE SOME INACCURACIES IN "Building an Expandable Network" (May 1993), by Douglas Welch, that could lead to trouble, not expandability.

Level 1 cable is intended for voice and low-speed data up to 20 Kbps, not 200 Kbps; Level 3 cable is intended for LAN applications up to 10 Mbps, not 20 Mbps; Level 4 cable is specified to 20MHz and will support 16 Mbps; Level 5 cable is specified to 100MHz and will support data rates up to 100 Mbps, not 200 Mbps.

Also, while you can run LocalTalk 4500 feet on 22-gauge wire and 3000 feet on 24-gauge wire, you can only run 10BaseT on 328 feet of wire. Therefore, if you ever plan on upgrading your network (and even if you don't plan on it), you should think of distances of 328 feet and no more. Since LocalTalk is not a future network, don't design around it!

Michael Paré
Woods Hole, Massachusetts

Marking Time

IN CHARLES SEITER'S REVIEW OF High Performance Systems' ithink 2.2.1 (May 1993), I found it amusing that the cons summary read "Requires real training commitment for effective use." Imagine, you have to know what you're doing in order to use the software effectively! If taking the time to work through unfamiliar concepts is a shortcoming, then we've made less progress than ithink.

Barry Sedlik
Walnut, California

Lapis Responds

WE APPRECIATE YOUR GENERally positive review of L-TV in your May 1993 issue. However, it's clear that the reviewer didn't fully understand the product, and the few incompatibilities were not accurately addressed.

L-TV is a low-cost, entry-level multimedia tool, and the reviewed model was designed primarily to meet the needs of the K–12 teacher who is using the Mac LC in the classroom. It's obviously no substitute for studio-quality equipment that costs much more.

The reviewer pointed out (as we do in the L-TV Read Me file), that there are possible conflicts with Macromedia's Director. Director does not obey the QuickDraw rules, and L-TV is designed to operate with QuickDraw-based programs. We provide a special mode for Director and other non-QuickDraw-based programs that solves the problem.

Finally, the reviewer criticized the quality of text on the television screen. The display quality of a television set is inherently inferior to that of a computer monitor, but this is not the fault of L-TV. Picture quality on graphics and large text is excellent, and that is what the product was designed to display.

L-TV cards are an affordable, high-quality method of projecting a Macintosh

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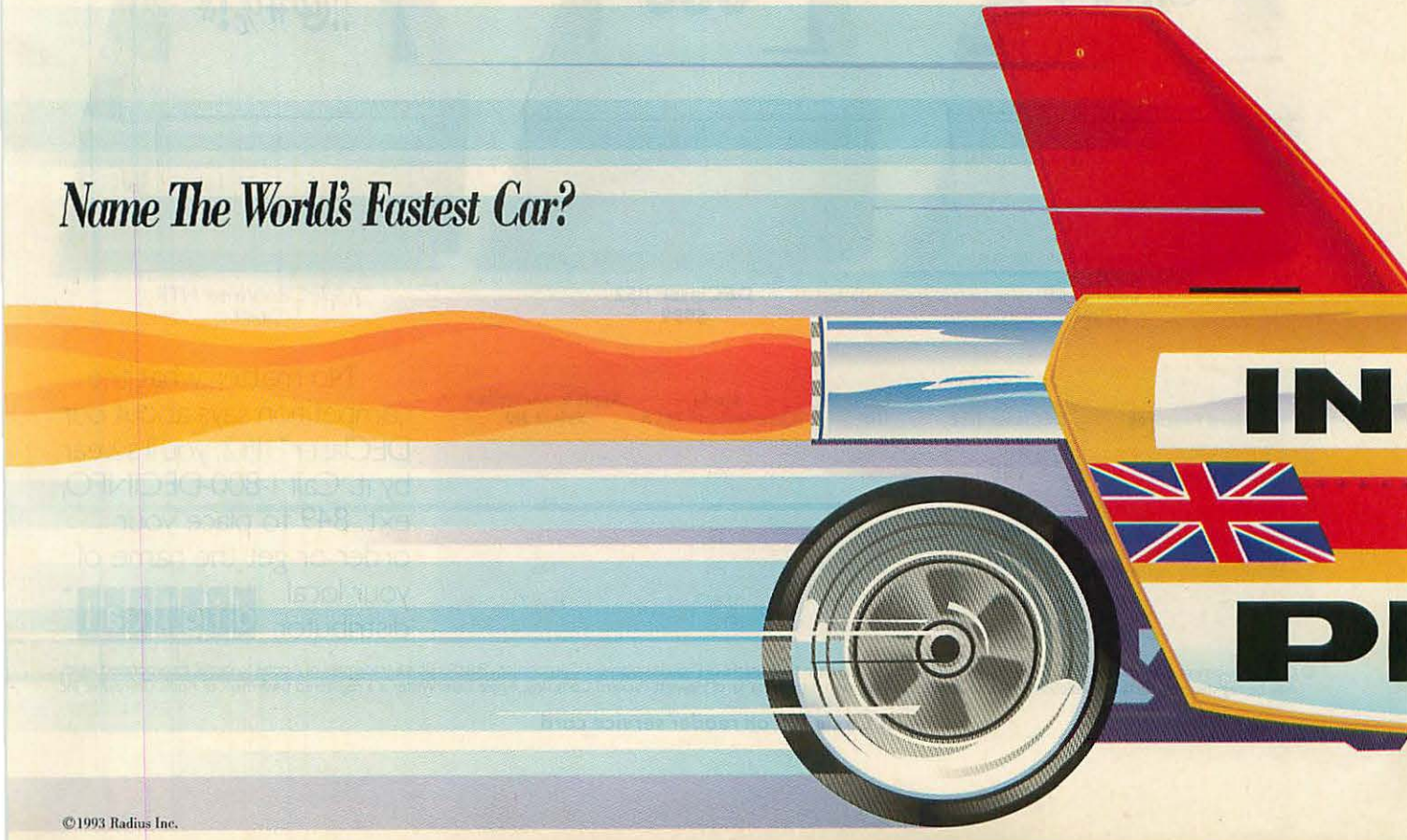

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screen image onto a television or recording the image to videotape. Our users clearly understand the features and usefulness of the product—apparently the reviewer did not.

James Harris
President and CEO
Lapis Technologies
Alameda, California

The Read Me file outlines the possible conflicts with Director and then states, "If there is a conflict with Director presentations (or some other similar situation), use the keyboard to switch into DIRECT mode for the L-TV software." The file doesn't clearly state that this remedy solves the problem, and nowhere describes this as "a special mode for Director and other non-QuickDraw-based applications." The notes even warn that "DIRECT mode may result in a somewhat slower screen update than the normal FAST mode," so we hesitate to consider this a real solution.

We criticized the text display because not doing so would have been misleading. L-TV is not a low-cost alternative to a large-screen display or a second monitor, nor does Lapis Technologies claim that it is. If we did not understand the features and usefulness of the product, we would not have awarded it three stars, indicating that it is a good product—one that works quite well when used as intended.—Ed.

We Don't Need No Stinkin' Slots

ADRIAN MELLO, IN HIS REVIEW OF the new Macintosh lineup (*State of the Mac*, May 1993), agrees with Apple's mistaken assumption that all Macintosh users want power and expandability in equal proportions. This might be true of users who focus on graphics, but many of us in the mainstream business community don't need expansion slots, but crave increased speed. Our ideal Mac would have a 33MHz 68040 in an LC case, or a Centris 610 case for those who want CD-ROM. We would even forgo an FPU if Motorola insists on its Intel-esque pricing scheme.

Craig Jacobson
New York, New York

ARA Again

IN THE MAY 1993 *MACWORLD*, YOU printed a letter that stated that V.42bis and MNP 5 hardware-based compression will work on top of AppleTalk Remote Access's software-based correction. In fact, ARA's modem scripts explicitly turn off hardware-based data compression and verification, leaving the work to be done by the software.

Jim Robertson
Ames, Iowa

Jim's got it right, and now, after several conversations with Apple, so do we.—Ed.

RSI Cry

I FOUND THE UNMOUSE REVIEW (MAY 1993) interesting. Has Ann Garrison or anybody found a way around the repetitive-strain injury problem with the mouse-using arm and side of neck?

Paul C. Colombo
via CompuServe

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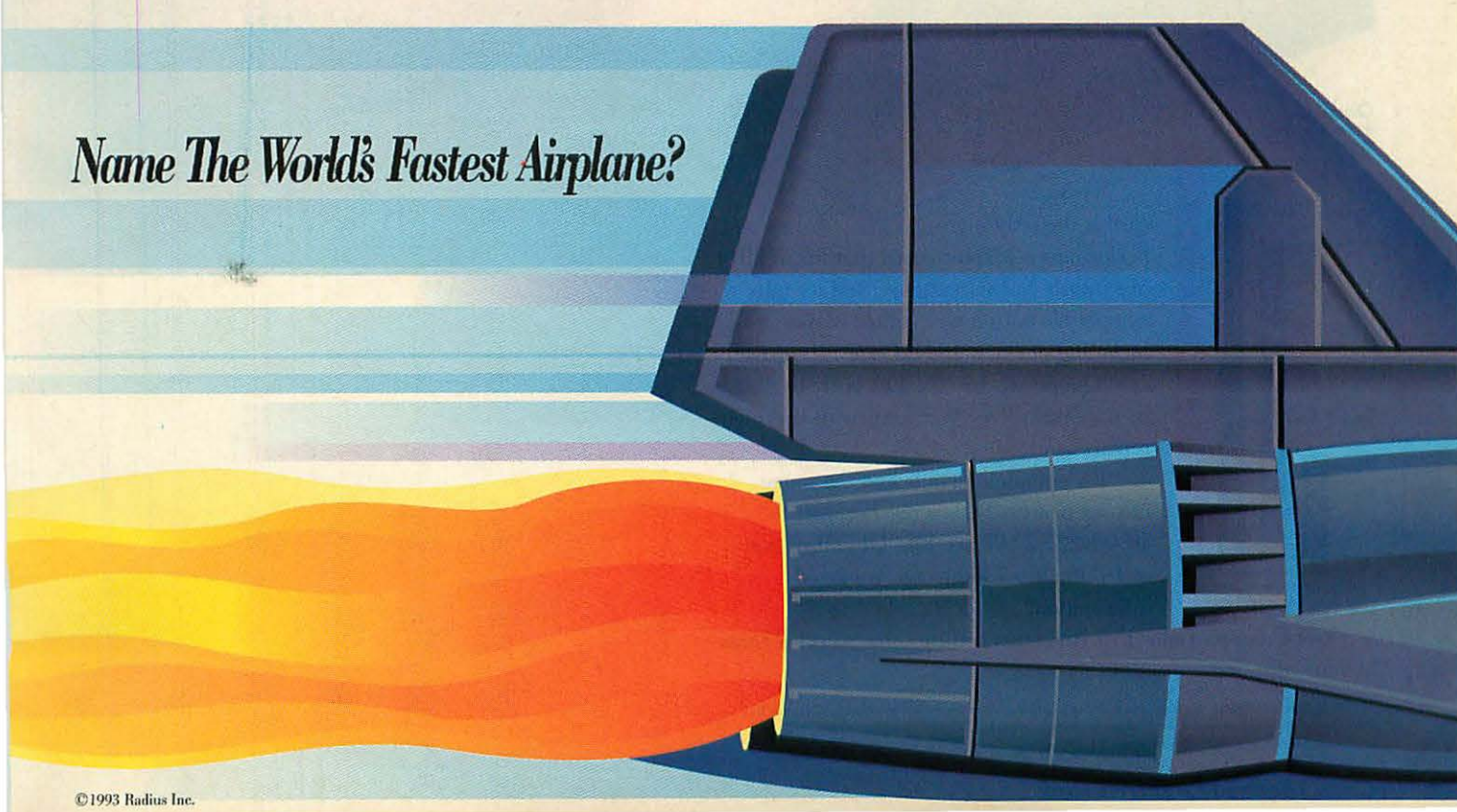

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Art Beat

Behind Macworld's Graphics

BY CATHY ABES

Artist: San Francisco–based Jim Ludtke is a skilled 3-D illustrator and animator whose work has been shown at New York's Museum of Modern Art. He has produced 3-D illustrations for such varied clients as Sony, *Newsweek*, Nintendo, and AT&T, and animations for Nickelodeon, the Residents, Time Warner New Media, and The Voyager Company, among others.

Hardware: Quadra 900 with 52MB of RAM and 650MB internal hard drive; SyQuest 44MB removable-cartridge drive; Hammer 650 rewritable optical drive; Wacom 12-inch graphics tablet; E-Machines 16-inch and AppleColor High-Res RGB 13-inch color monitors.

Software: MacroModel 1.5; ElectricImage Animation System 1.5; Adobe Photoshop 2.5; Adobe Illustrator 3.01.

How It Was Done: To create the opening illustration for this month's comparative review of 3-D modeling programs, Ludtke produced an elaborate three-dimensional scene that he created in six separate sections and ultimately composited together in Photoshop.

The final composited page that illustrates our feature on 3-D modelers.

To create the bumpy ground, Ludtke used a Photoshop plug-in module called CyberSave, which converts two-dimensional gray-scale images into 3-D models in one of three shapes—a sphere, a cylinder, or a flat plane. Lighter areas of the image become raised, while darker areas are recessed.

After scanning a photo of some pebbles, Ludtke enhanced the image in Photoshop by giving the pebbles more-irregular shapes and by adding more elements such as bones and roots. He saved the image as a color texture map for later use in ElectricImage. Then, after converting the color texture map to gray-scale in Photoshop, he painted those added elements a brighter shade of gray, and saved the image in CyberSave format. This resulted in a 3-D mesh with various elements upraised above the ground's surface.

Once he had imported the relief model of the ground into ElectricImage, Ludtke used the color texture map (the previously saved file of the surface textures) to add color to all the objects. Since both the three-dimensional model and the texture map were created from the same file, Ludtke was able to align them exactly—making the bones one color, the pebbles another color, the roots a third color, and so forth.

He modeled the hammer and chisel in MacroModel, and then imported them into ElectricImage, where he added texture maps he had previously created.

To create the curving, bumpy surface of the cave wall, Ludtke built a wire-frame model in MacroModel. After drawing several wavy cross sections of the wall, he used MacroModel's skin tool to create a mesh between them. Then he saved the model and imported it into ElectricImage, where he added a texture map he'd previously created in Photoshop. The texture map was actually a collage combining scanned images of technical

continues

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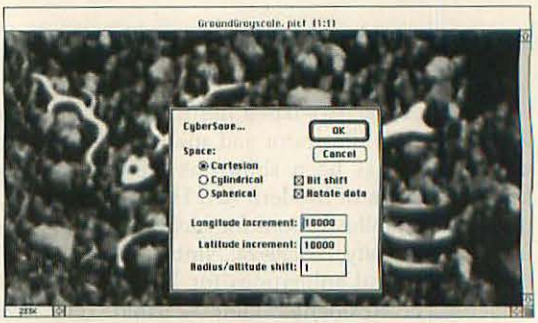
diagrams with drawn images of cave paintings and hieroglyphics. In Photoshop's alpha channel, he had added more elements that would function as bump maps when the model was rendered in ElectricImage.

To create the rocks in MacroModel, Ludtke used the polyline tool to draw cross sections of various shapes. He then used the skin tool to create a mesh between them. After saving and importing the shapes into ElectricImage, he went back to Photoshop. There he drew a marbly texture in the RGB channel and a bump map in the alpha channel (just as he had for the cave wall) and used them together as a single texture map in ElectricImage.

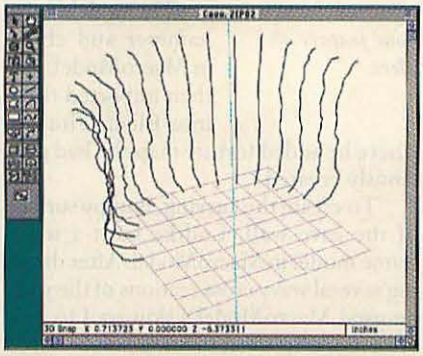
To accentuate the craggy look of the rocks and the unevenness of the bump map, he positioned a white light above the rocks and a red light below the rocks. Then he saved and rendered the rocks.

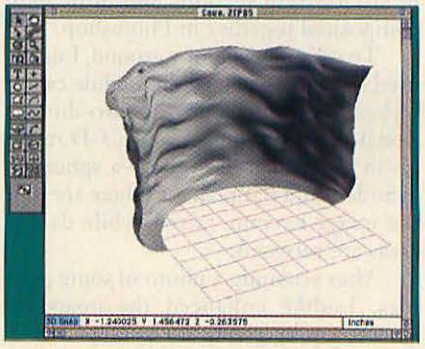
Next, Ludtke went back to Photoshop's CyberSave to create the curved surface of the back of the dome. In Photoshop, after creating a gray-scale gradient from dark gray at the top to white at the bottom, he blocked out an area in the center of the gradient about half the gradient's size and made this area completely black. Then he exported the gradient to CyberSave as a cylinder. Where the gradient was dark, the cylinder got smaller, and where the gradient was light, the cylinder expanded—resulting in a dome shape. Since totally black areas do not generate 3-D geometry in CyberSave, the black area in the center of the gradient—now part of the dome—gave the illusion of a cutaway in the front of the dome. After importing the file into ElectricImage, he texture-mapped it with a file that was tiled around the inside of the model to give the appearance of a Renaissance dome.

To create the front of the dome, Ludtke duplicated the gray-scale art he'd

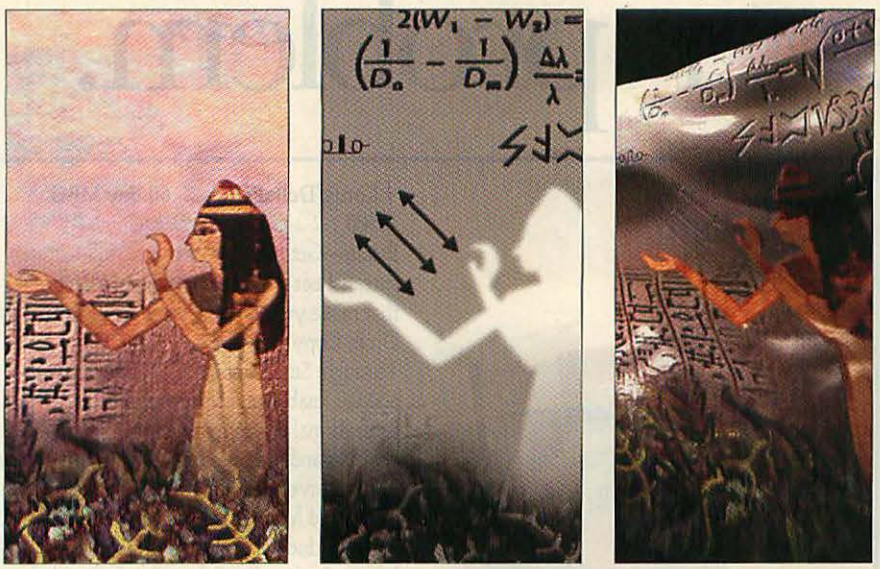


To create the ground, Ludtke exported the gray-scale image of the pebbles, bones, and roots to the Photoshop plug-in CyberSave (top). This converted it into a 3-D mesh (middle) in which the lighter areas were raised above the surface and the darker ones were recessed. The image was then rendered in ElectricImage (bottom).

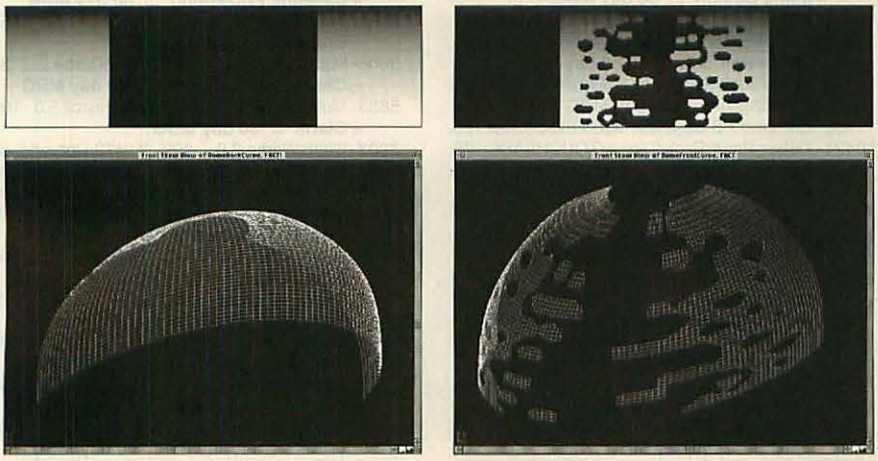




Ludtke created the cave wall in MacroModel by first drawing a wire-frame model with numerous wavy cross sections (above). Then he used MacroModel's skin tool to create a mesh between each cross section, overlaying the wire-frame model with a skin-like craggy surface texture (right).



After the model of the cave wall was imported into ElectricImage, Ludtke superimposed a color texture map he had previously created in Photoshop (left). In Photoshop's alpha channel, he created a gray-scale version of the texture map with some additional elements to use as a bump map (middle) for the final rendering of the wall (right).



In Photoshop, Ludtke created a gray-scale gradient with a black center (top) to generate the back curve of the dome, which he exported to CyberSave as a cylinder. Because the gradient was dark at the top and light at the bottom, the cylinder narrowed at the top and widened at the bottom, resulting in a dome-shape wire frame (bottom).

For the front curve of the dome, Ludtke used the same image he'd used for the back—but this time he made the center area the gradient and the sides black (top). He used black to cut out various chunks in the center of the gradient before exporting it into CyberSave to create the wire frame of the dome's front (bottom).

used to create the back of the dome, but switched the positions of the dark and light areas so that the sides were black and the center was the gradient. Then, using 100 percent black, he cut out various areas of the gradient to create the illusion of perforations. Then he exported the file into CyberSave to create a new model that was the reverse of the back, so the front curve would exactly fit onto the back curve of the dome. The perforations made the dome appear to be under construction. After importing the dome into ElectricImage, he mapped onto the dome a scan of an old stone wall—to give the suggestion that this was what the dome was constructed from.

To create the sky, Ludtke scanned in a photo of a sunset, then painted and color-enhanced it in Photoshop. He used the Twirl filter to swirl the clouds; then he darkened the top half of the sky using a gradient alpha channel. After drawing the curves and splines in Adobe Illustrator, he imported that file into Photoshop in antialiased PICT format, over which he superimposed the sky. The stars were simply painted in.

Once all the separate files were rendered, Ludtke opened each of them in Photoshop and composited them into the final image. The final image size was 14MB. The image took approximately 40 hours to complete. ■

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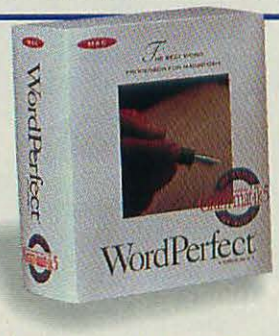

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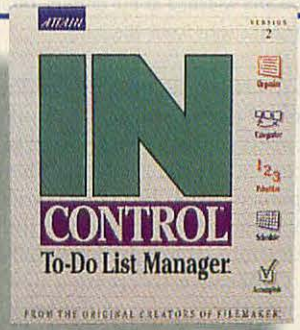

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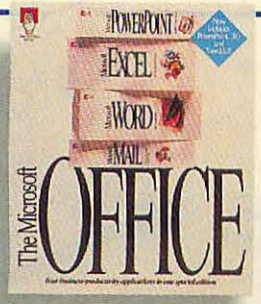

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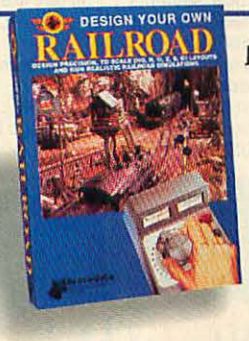

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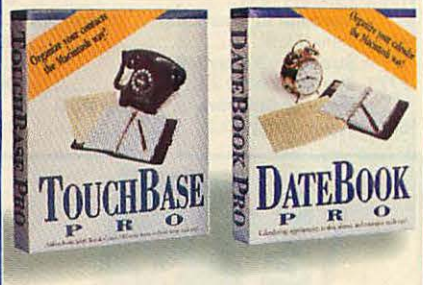

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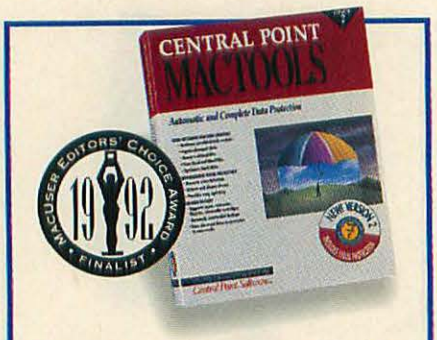

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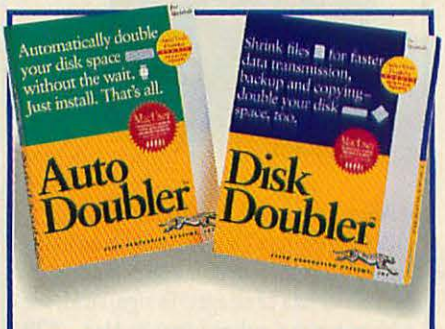
8210 PLOTTERgeist 2.1 ... 249.
★ **SNA, Inc. ... 30 day MBG**
10594 Offline 3.82 ... 62.
Stac Electronics
11568 Stacker for Mac ... 65.
★ **Symantec ... 60 day MBG**
5176 SAM 3.5 64. 6748 Norton Utilities 2.0 95.
9957 THINK Ref 2.0 89. 2688 THINK C 6.0 199.
★ **Teknosys ... 30 day MBG**
5203 Help! ... 88.
★ **TGS Systems ... 60 day MBG**
6667 Prograph 2.5.2 ... 299.
★ **Thought I Could ... 30 day MBG**
4843 Wallpaper 37. 10839 More Wallpaper 25.
UserLand Software
4753 Frontier 2.0 ... 185.

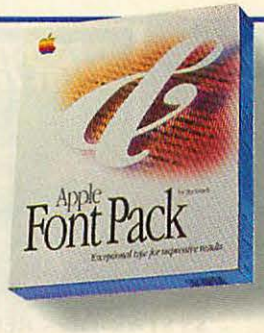
LEARN & PLAY
FOREIGN LANGUAGES, TRAINING, GAMES

★ **Abbott Systems ... 30 day MBG**
9578 Kaleidoscope 1.0 ... 25.
ActiVision
1039 Shanghai II 29. 1134 Lost Treasures Vol. I 40.
Broderbund Software
Carmen Sandiego Series *(CP)*..... *ea.* 29.
8285 Where/World Carmen Sandiego Deluxe 47.
11561 TRISTAN Pinball ... 35.



★**Fifth Generation ... 30 day MBG**
12298 *AutoDoubler/DiskDoubler Combo*—AutoDoubler doubles your disk space by automatically compressing your files. DiskDoubler shrinks files for faster data transmission, backup and copying... **$85.**

tech experts a try.



★Apple Computer ... 30 day MBG

3008 *Apple Font Pack*—Collection of 43 superb TrueType fonts can improve the look of *all* your communications, from word processing and spreadsheet documents to presentations and faxes. Reqs. System 7 ..... **$74.**

Buena Vista Software
1711 Heaven and Earth ..... 34.
★ **Callisto ... 30 day MBG**
11369 Super Mines 29. 11756 Super Maze Wars 39.
11757 Super Maze Wars Network Pack ..... 59.
★ **Carina ... 30 day MBG**
7761 Voyager II, the Dynamic Sky Simulator.. 99.
★ **Centron Software ... 30 day MBG**
11959 WordSearch Creator ..... 30.
5910 Crossword Creator 39. 8524 Casino Master 45.
Changeling Software
11188 Pax Imperia ..... 35.
Colorado Spectrum
2554 Mouse Yoke *(aircraft yoke adapter)* ..... 29.
★ **Davidson & Associates ... 30 day MBG**
10953 Kid Pictures 19. 3922 Talking Spell It + 28.
2574 MathBlaster Plus or 7942 Kid Works 2.. 34.
Delta Tao Software
2536 Spaceward Ho! or 2439 Strategic Conq. 36.
★ **Edmark Corporation ... 30 day MBG**
7155 Kid Desk 24. 7318 Millie's Math House 29.

Articulate Systems, Inc.

Voice Navigator SW—Voice Recognition Software for all sound-capable Macs ..... **$319.**

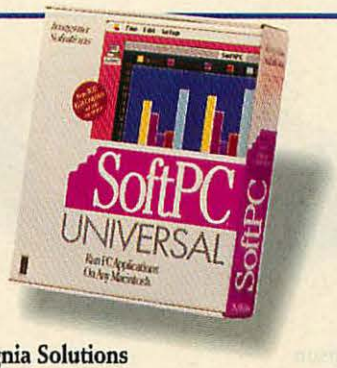
Voice Navigator II—Voice Recognition Hardware & Software for all Macs ..... **469.**

Both incl. Headset Mike or Desktop Mike.

Electronic Arts
1907 PGA Golf 39. 2805 Tournament Course $18.
★ **Expert Software ... 30 day MBG**
6219 Expert Astronomer 1.1.1 ..... 29.
Graphic Simulations
8083 Missions at Leyte Gulf *(req. Hellcats)*.... 20.
4756 Hellcats Over the Pacific 1.0.3 ..... 38.
★ **Great Wave ... 30 day MBG**
6693 KidsMath 2.0 or 2276 Kid's Time .... *ea.* 25.
8527 NumberMaze or 3471 DaisyQuest.. *ea.* 35.
★ **HyperGlot Software ... 30 day MBG**
(French, German, Italian & Spanish)
Word Torture *ea.* 32. Tense Tutor.. *ea.* 38.
Pronunciation Tutor *(Span., Fren.)* ...*ea.* 32.
★ **Inline Design ... 30 day MBG**
1562 3 in Three..... 31. 7646 Tinies..... 37.
Interplay Productions
1894 BattleChess .. 29. 1893 CheckMate.. 31.
10935 Out Of This World..... 34.
★ **Learning Company ... 30 day MBG**
Reader Rabbit Series..... *ea.* 34.
3281 The Writing Center 1.0 ..... 51.
★ **Leister Productions ... 30 day MBG**
7126 Reunion 3.0..... 115.
★ **Maxis ... 30 day MBG**
11272 SimAnt..... 29. 11270 SimLife..... 39.
11629 SimCity Supreme Bundle ..... 45.
11628 A-Train Bundle ..... 45.
★ **MECC ... 30 day MBG**
3960 Number or 3959 Word Munchers... *ea.* 18.
3963 Oregon Trail 1.1 ..... 28.
★ **Microlytics ... 60 day MBG**
7871 Berlitz Interpreter..... 29.
★ **Microsoft ... 30 day MBG**
2868 Flight Simulator 4.0 *(CP)*..... 42.
★ **Penton Overseas ... 30 day MBG**
VocabuLearn/ce Levels I & II *(Span., Fren., Germ., Ital., Rus., Japan., & Heb.)*... *ea.* 35.
VocabuLearn/ce Level III *(Span., Fren., Germ., Ital., Rus., & Japan.)*..... *ea.* 35.
Pluma, Inc.
8695 Capitalist Pig ..... 34.
Psygnosis
11562 Lemmings..... 35.
★ **Que Software ... 30 day MBG**
9743 Typing Tutor V..... 29.
Sierra On-Line
11098 Crosswords... 20. 7396 Red Baron .. 39.
Software Toolworks
4619 Mavis Beacon Typing 2.0 *(CP)*..... 29.
★ **Spectrum Holobyte ... 30 day MBG**
3464 Tetris..... 22. 3017 Wordtris 1.0.. 28.
4835 Super Tetris 28. 9113 Falcon Color. 39.
StudyWare
ACT, GMAT, GRE or SAT Prep ..... *ea.* 29.
★ **Toyogo ... 30 day MBG**
7624 NEMESIS Go Master 35. 7623 Deluxe 99.
Velocity
11538 Spectre Supreme 40. 11537 LAN 2-Pak 52.

VIDEO AND SOUND
MONITORS, MUSIC, ANIMATION

Articulate Systems
7007 Voice Record 56. 2034 Voice Impact 79.
Voice Navigator SW (Head/Desk Mike) *ea.* 319.
Voice Navigator II (Head/Desk Mike) *ea.* 469.
Coda Music Technology
8188 MusicProse 2.1 189. 5604 Finale 549.
Envisio
4106 Quick-16..... 399. 11485 Pressto... 639.



Insignia Solutions

4089 *Universal SoftPC*—Create an MS-DOS window on any Mac computer. Load MS-DOS programs into your Macintosh—even those that come on a PC CD-ROM—and use them like you would on a basic IBM 286 AT.. **$99.**

Macromedia
5486 Sound Edit PRO 199. 7651 Action! Mac 349.
4598 MacRecorder Sound System PRO..... 239.
5087 MacroMind Director 799. 2246 3-D 999.
★ **MediaVision ... 60 day MBG**
11738 Pro Audio Spectrum 16 NuBus ..... 329.
NEC
4252 MultiSync 3FGx..... 689.
Nova Development
11101 Kaboom! 29. 12278 w/More Kaboom! 40.
★ **Nutmeg Systems ... 30 day MBG**
15" Monochrome System for the II, LC, SE/30, si and SE ..... *ea.* 519.
Passport Designs
10362 Passport Producer 299. 8250 Encore 379.
Radius
1738 PrecisionColor Pivot *(reqs. interface)*.. 999.
7870 Rocket 33 ..... 1599.
RasterOps
8944 RasterOps 24STV ..... 799.
11258 Editing Aces Suite/Digital Video Solution 3379.

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They've seen it all.

Epson
11308 *ES-600C SCSI Scanner*—Provides quality color input for desktop publishing and business presentations at 600 dpi.. **$899.**
10741 *ES-800C Scanner*—Faster & 800 dpi **1199.**
3052 *Interface Kit (required for above)* ..... **325.**

Sigma Designs
11541 ErgoView 17 ..... 1349.
Software Toolworks
5201 The Miracle *(piano teacher)* ..... 349.
Sony
10530 14" Multiscan Trinitron Monitor ..... 689.
10529 17" Multiscan Trinitron Monitor ..... 1149.
Sound Source
Star Trek: Original TV Vol. 1 or 2 ... *ea.* 30.
11483 Star Trek: Next Generation Virtual Data 30.
11484 Star Wars 30. 1759 A Space Odyssey 35.
★ **SuperMac/E-Machines ... 30 day MBG**
4122 VideoSpigot LC 245. 4164 *(for NuBus)* 375.
7676 VideoSpigot Pro or 3691 Pro si... *ea.* 1039.
9074 Spectrum/24 PDQ+ ..... 1549.
7679 Spigot & Sound.. 489. 7678 Pro... 1129.
7677 17" SuperMatch Multimode ..... 999.
1805 20" SuperMatch Color Display ..... 1549.
4720 21" Platinum Two-Display ..... 1099.
10321 ColorPage T16II ..... 1339.
9066 Futura SX.. 485. 9065 Futura MX ..... 839.

CD-ROM

Against All Odds
10330 From Alice To Ocean Book *(w/CDs)* ..... 39.
Broderbund
3730 Just Grandma and Me ..... 34.
9059 Arthur's Teacher Trouble ..... 41.
CD Technology
2321 CD-ROM Caddy $11. 2533 *(5 Pack)* $49.
4084 America Alive! 75. 8057 Porta Drive 619.
Creative Multimedia Corp.
11001 The Complete Works 19. 11004 Audubon 45.
11003 Family Doctor HyperCard Version ..... 45.
★ **Cyan ... 30 day MBG**
1343 Manhole 23. 2717 Cosmic Osmo 1.1 37.
FWB, Inc.
10198 CD Toolkit.. 49. 11582 HammerCD.. 739.
★ **Highlighted Data ... 30 day MBG**
7771 Webster's Dictionary ..... 149.
★ **HyperGlot Software ... 30 day MBG**
(French, German, Italian, or Spanish)
Berlitz Think & Talk ..... *ea.* 125.
Interplay Productions
7111 Battlechess CD-ROM Enhanced ..... 45.
★ **MediaVision ... 60 day MBG**
11570 CD-ROM Multimedia Kit ..... 799.
★ **METATEC/Discovery Sys.. ... 60 day MBG**
9967 Nautilus Mini-Subscription Kit ..... 20.
4007 World Almanac & Book of Facts 1993... 50.
★ **Multimedia Library ... 30 day MBG**
IMAGE Series Vol. 1-4, 8 ..... *ea.* 105.
7313 SOUND Series Vol. 1 ..... 105.
NEC
6577 CDR-38 Portable CD-ROM Drive ..... 479.
6582 CDR-74-1 CD-ROM Drive ..... 629.
Peripheral Land, Inc. (PLI)
10923 Multi-Session Photo CD-ROM Drive ... 699.
★ **Presto Studios ... 30 day MBG**
11330 The Journeyman Project ..... 56.
Quantum Leap Tech.
11457 Aesopolis ..... 49.
Queue, Inc.
11186 Velveteen Rabbit ..... 29.
11183 Greatest Children's Stories ..... 29.
Software Toolworks
10308 US Atlas 34. 3915 Grolier Encyclopedia 249.
Warner New Media
11008 Desert Storm 27. 11007 Word Tales 39.
11028 Magic Flute 44. 11026 The Orchestra 54.
Wayzata Technology
Font Pro Vol. 1 & 2 ..... *ea.* 59.
11605 CD Fun House 25. 10188 Macnificent 7 35.

COMMUNICATIONS
MODEMS, MAIL, NETWORKS

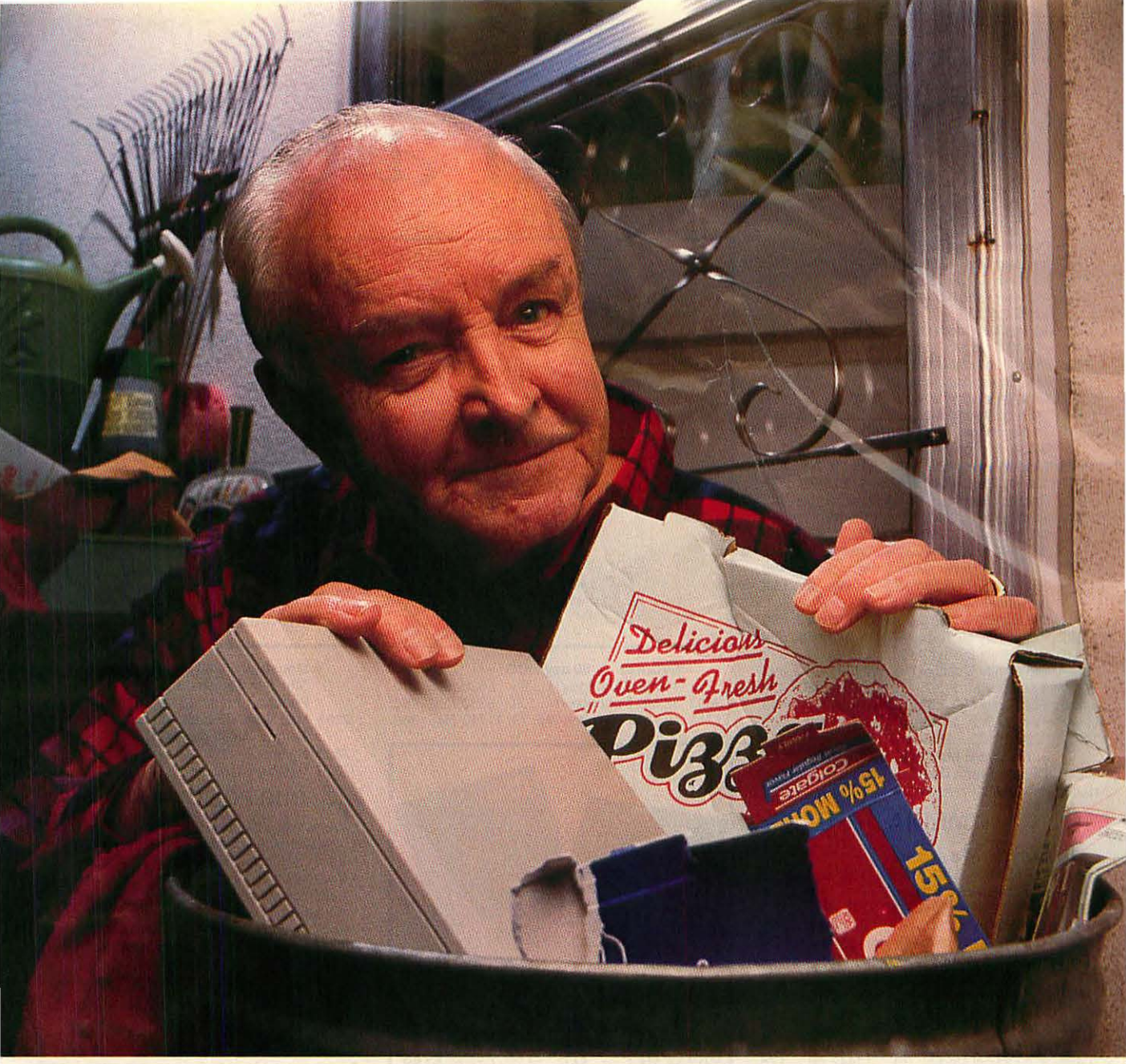
★ **Apple Computer ... 30 day MBG**
7073 Mac PC Exchg. 59. 7102 AppleShare 969.
7101 AppleTalk Remote Access ..... 149.
★ **Applied Engineering ... 30 day MBG**
11707 QuadraLink... 199. 10361 DMA..... 399.

$5 STAR TREK REBATE!

★**Berkeley Systems ... 30 day MBG**
3392 *Star Trek: The Screen Saver*—Beam aboard the Enterprise & prevent screen burn-in—15 screens to select from ..... **$34.**
5737 *After Dark 2.0x (30+ screens!)* ..... **28.**
2196 *After Dark & More After Dark Bundle* **39.**

Asanté Technologies, Inc.
2775 10/T Hub-8 249. 2772 10/T Hub-12 499.
BOCA Research
11052 M144I V.32bis FaxModem ..... 239.
★ **Cardinal Technologies ... 30 day MBG**
7670 MVP24MAC 69. 11621 MVP96MAC 179.
11698 MVP144MAC ..... 239.
★ **CE Software ... 60 day MBG**
8066 QuickMail *(5 user)* 279. 8067 *(10)* 399.
★ **CompuServe ... 60 day MBG**
1676 Mac Membership Kit 2.0.2 ..... 25.
1673 Navigator 3.2..... 49. 1674 Bundle... 72.
★ **Datawatch ... 30 day MBG**
11490 ScreenLink Twin Pack 2.0.5 ..... 62.
★ **DataViz ... 60 day MBG**
1823 MacLink Plus/PC ..... 129.
4842 MacLink Plus/Translators ..... 109.
★ **Dayna ... 60 day MBG**
11878 DOS Mounter Plus ..... 54.
12041 Safe Deposit Personal ..... 59.
DaynaPORT E: *(BNC or 10 BASE-T)* *ea.* 149.
8719 EtherPrint or 9888 *(10BASE-T)* ..... *ea.* 339.
11012 EtherPrint 3 379. 11011 EtherPrint 3+ 479.
1962 PathFinder ..... 599.
12047 DaynaSTAR HUB 24 ..... 869.
★ **Dove Computer ... 30 day MBG**
6758 DoveFax 2..... 199. 3352 NuBus.... 199.
9634 DoveFax+V.... 299. 4111 NuBus.... 299.
10199 DoveFax Pro..... 399. 10200 Pro+V ..... 499.
★ **Dow Jones ... 30 day MBG**
5295 Dow Jones News Retrieval Membership 24.
★ **Farallon Computing ... 30 day MBG**
Full line of EtherMac Cards available ... call
4869 PhoneNET Connector 10-Pk *(DIN8)*... 195.
2206 PhoneNET StarController 307..... 879.
4802 Star 357... 899. 4814 Star 377 ..... 1299.
9805 Timbuktu 5.0 or 4866 /Remote 3.0..... 129.
9516 PowerPath.. 105. 9518 LocalPath.. 139.
★ **Freesoft ... 30 day MBG**
6115 White Knight 11 ..... 85.
★ **Global Village ... 30 day MBG**
2175 TelePort/Silver... 319. 2179 Gold ... 369.
Hayes
10822 Accura 2400 ..... 69.
11422 Accura 96 Fax.. 229. 11419 144 Fax 259.
2300 Smartcom II Mac 84. 3226 Upgrade 44.
5971 OPTIMA 24 119. 5970 OPTIMA 96 359.
Insignia Solutions
7557 Access PC.. 59. 3441 SoftNode 2.0.. 89.
4089 Univ. SoftPC. 99. 10553 SoftPC Win .. 299.
11631 SoftPC Pro 3.0/RapidTrak Bundle..... 195.
Logicode Technology
5525 Quicktel Xeba M9624XV ..... 132.
5524 M9696XV... 252. 5523 M1414XV... 265.

★**WordPerfect ... 30 day MBG**
11720 *WordPerfect Works Bundle*—Includes word processing, database, spreadsheet, charting, drawing and painting, and communications software, all seamlessly integrated into one powerful program. Get added value when you buy WordPerfect Works along with: Intuit's Quicken 3.0, one of the most widely used personal finance programs on the market; Casady & Greene's QuickDex II, quick reference to names, addresses, phone numbers and more in a rolodex card format; and Inline Design's S.C.OUT, a puzzle/action game where you have to reactivate a moon base that has been invaded by aliens. Four great products at a super price **special $149.**



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Robert A. Lessard

Robert A. Lessard
Nashua, New Hampshire

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7570 hammer 80is.. 299. 7579 Int. 120is. 399.
7991 hammer1000FMF ..... 1749.
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IOMEGA

6499 90 MB Transportable *(reqs. interface)*. 659.
2467 90 MB Gold Std. Rem. Cart. *(Qty. 3)*... 379.
7789 Mac 1B Interface *(w/Central Pt. Backup)* 39.
8781 Mac Transportable 90 PRO ..... 499.
10500 21 MB Floptical Drive ..... 459.
11943 1" Portable 210 MB ..... 529.
10499 Transportable MultiDisk 150 ..... 799.

MASS Microsystems

2973 120 MB HD 449. 2972 210 MB HD 539.
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10848 DataPak 88c 649. 11650 DataPak 105 839.
7008 HitchHiker Portable Drive *(120 MB)* .... 649.

★ **MDS Drives ... 60 day MBG**

MDS 44 SyQuest w/SW & cartridge *ea.* 419.
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MDS 88c SyQuest w/SW & cartridge *ea.* 599.

Peripheral Land, Inc. (PLI)

6432 3½" Optical Media 52. 9737 *(10 pak)* 499.
8327 *PLI* Infinity 40 Turbo 479. 9752 88 579.
11470 PLI Infinity 88/RW 44 ..... 699.
2864 PLI Infinity Floptical Drive *(21 MB)* ..... 399.
10926 1 GB Drive.. 1739. 10849 170 MB.. 479.
4645 PLI Infinity MO 3.5" Optical Drive ..... 1449.
2865 Floptical Cart. *(21 MB)* 29. 2899 *(10 pk.)* 259.
10733 520 MB ..... 1349.

★ **SuperMac/E-Machines ... 30 day MBG**

2256 ThunderStorm Deluxe ..... 899.
10322 PowerLink Presentor ..... 439.

MEDIA

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11803 3½" HD Disks *(40)* w/free T-120 *special* 45.

★ **Fuji ... 60 day MBG**

2214 3½" DS Disks *(10)*..... 9. 2242 *(50)*..... 32.
7379 3½" HD Disks *(11)*... 13. 2241 *(50)* ..... 58.
4863 3½" HD Disks *(20)* with storage case.... 25.

★ **Kao Infosystems ... 60 day MBG**

11866 3½" DS Disks *(10)*.... 8. 11865 *(30)*..... 22.
11864 3½" DS Disks *(50)* ..... 32.
11870 3½" HD Disks *(10)*.. 12. 11869 *(30)* .... 35.
11867 3½" HD Disks *(50)* ..... 50.

KOMAG

10439 3½" Optical Media.. 39. 10442 *(5)*... 175.

★ **Sony ... 60 day MBG**

3297 3½" DS Disks *(10)*.... 9. 6148 *(30)*..... 25.
3298 3½" HD Disks *(10)*.. 14. 6375 *(30)* ..... 39.
1603 DG60M..... 15. 2520 DG90M..... 19.
1895 QD2120 19. 11524 3.5" Opt. Media .. 50.

FWB, Inc.

7991 *hammer1000FMF*—1,000 MB high performance hard disk with 9ms average seek. Includes a 2 year warranty and *Hard Disk ToolKit* utility software..... **$1749.**

★ **MDS Drives ... 60 day MBG**

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MDS Removable SyQuest Drives—Come complete with one cartridge.

8141 *MDS 44*..... **$419.**
8125 *MDS 88*... **499.** 10590 *MDS 88c* **599.**

MDS Fixed Drives—available in zero footprint (ZFP) or upright (UP) models. ZFPs come with a shielded 18" SCSI cable and two switched AC outlets. Uprights include a 3' SCSI cable.

11881 *MDS 120 MB zero footprint*..... **399.**
11880 *210 MB*.. **499.** 11863 *540 MB* **1149.**
11963 *MDS 120 MB upright*..... **429.**
11962 *210 MB*.. **539.** 11961 *540 MB* **1199.**

★ **SyQuest ... 60 day MBG**

5912 44 MB Cartridge *(1)*... 65. 5528 *(5)*.. 310.
3603 88 MB Cartridge *(1)*.. 100. 5530 *(5)*.. 480.
11711 105 MB Cartridge *(1)*.. 79. 11710 *(5)*.. 369.

★ **SyQuest ... 30 day MBG**

Cartridges for SyQuest removable drives.

5912 *44 MB Cart.*. **$65.** 5529 *(3 Pack)*. **$189.**
5528 *(5 Pack)* ..... **310.** 9728 *(10 Pack)*. **615.**
3603 *88 MB Cart.*. **100.** 5531 *(3 Pack)*... **292.**
5530 *(5 Pack)* ..... **480.** 3600 *(10 Pack)*. **950.**

TEAC

7671 CT600H 60 MB.. 16. 7672 150 MB ... 24.

★ **3M ... 60 day MBG**

1581 DC2120..... 22. 11013 *(3 pack)* 60.

ACCESSORIES
TONERS, CASES, DUST COVERS

American Power

3447 SurgeArrest Plus ..... 39.

★ **Apple Computer ... 30 day MBG**

9773 StyleWriter Ink Cart. 19. 8499 *(3 Pack)* 55.
7748 Personal LaserWriter Toner Cartridge .. 65.
1115 LaserWriter II Toner Cartridge..... 85.

★ **Avery ... 60 day MBG**

5392 Avery 5196 (3½"-*Disk Labels-Laser*)..... 29.

★ **Curtis Manufacturing ... 30 day MBG**

8973 Apple Security Kit *(SL-2)*..... 22.

★ **DOUBLECASE ... 30 day MBG**

10306 DOUBLECASE NB-4400..... 129.

★ **I/O Design Cases ... 30 day MBG**

8812 Ultimate Classic 59. 1941 Ultimate LC 89.

★ **Kensington *(full line)* ... 30 day MBG**

2559 Apple Security Kit 33. 4973 Pwr. Tree 20 24.

★ **Moustrak ... 30 day MBG**

Star Trek Mouspads..... *ea.* 14.

★ **Peachpit Press ... 30 day MBG**

2267 Mac Bible 4th Edition..... 24.

★ **Targus ... 60 day MBG**

7369 Notepac..... 35.
7370 Business Traveler..... 199.

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11878 *DOS Mounter Plus*—New from Dayna! Lets you access your MS-DOS files, removable media drives and NetWare servers from your Macintosh desktop for Mac-to-DOS file sharing..... **$54.**

★Lotus Development ... 60 day MBG
8123 cc:Mail Remote Mac 2.0..... 199.
★Practical Peripherals ... 30 day MBG
11044 PM9600FX MT FaxModem..... 209.
11045 PM14400FX MT FaxModem..... 229.
11046 PM14400FX Pocket FaxModem..... 389.
8063 PM14400FX FaxModem..... 419.
★Prometheus ... 30 day MBG
4724 Home Office.... 185. 8990 Ultima.... 375.
★PSI Integration, Inc. ... 30 day MBG
3143 COMstation ONE.. 139. 3142 TWO 239.
5340 COMstation FOUR 359. 6965 FIVE 429.
★Shiva ... 30 day MBG
LANRover/4E for ARA or Netware *ea.* 1699.
LANRover/8E for ARA or Netware *ea.* 2549.
3444 NetSerial 1.35 275. 6555 LanRover/L 599.
4347 NetBridge..... 599. 4942 TeleBridge 599.
NetModem/E *(thick, thin, 10BASE-T) ea.* 1479.
★Software Ventures ... 30 day MBG
1964 MicroPhone II... 139. 3455 Pro..... 209.
Sonic Systems, Inc.
7572 LaserBridge 135. 7573 SuperBridge 169.
★Sophisticated Circuits ... 30 day MBG
10172 Desktop Dialer..... 47.
★STF Technologies ... 30 day MBG
7644 FaxManager Plus... 74. 7638 LC..... 25.
Supra
11223 SupraFAXModem V.32bis 14400..... 285.
11245 SupraFAXModem V.32bis PowerBook 279.

★Synergy ... 30 day MBG
6618 VersaTerm 4.6 $90. 6619 PRO 3.6 $177.
★TechWorks ... 30 day MBG
1582 GraceLAN Network Manager..... 275.
1584 GraceLAN Network Manager Corporate 669.
Ethernet Cards..... call
Twincom
10335 24/96 Commuter..... 115.
10332 14.4 Pro 259. 10337 14.4 Voyager 325.
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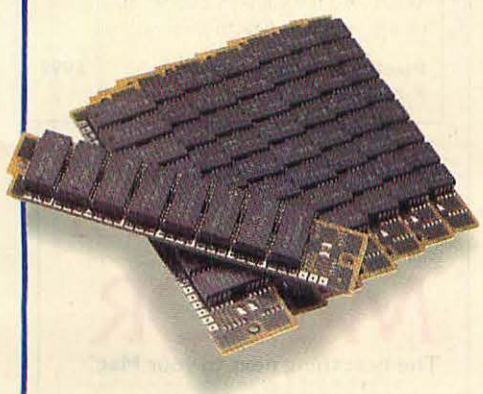

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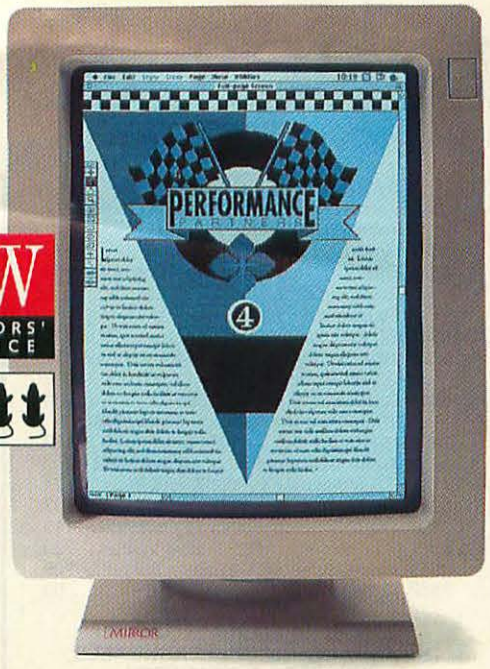

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Circle 122 on reader service card

Can This Be the Magic at Last?

BY STEVEN LEVY

THE MOUNTAIN VIEW, CALIfornia, offices of General Magic —the Ultimate Start-up—consist of a sprawl of cubicles and conference rooms. Like Cracker Jack boxes, each one holds a surprise. Anchoring the corner cubicle in the second-floor warren (an apt metaphor, since a brown rabbit named Bowser makes his home here) is Bill Atkinson, the designer of MacPaint and HyperCard. Next to him is Andy Hertzfeld, key architect of the Macintosh ROM. From there, you go to Dan Winkler (who wrote HyperTalk), QuickTime designer Bruce Leak, and a slew of other esteemed veterans, along with a new generation of rookie wizards.

It's the Silicon Valley equivalent of America's 1992 Olympic basketball squad—a digital Dream Team. And what is the dream? To change the world by bringing powerful digital communications to the masses. One day, "Star Trek"–ish devices—combinations of computer, telephone, fax, Filofax, wristwatch, and maybe even lawn mower—will be standard equipment for just plain folks. General Magic wants, craves, desires to be, *insists* it will be, the company to make this happen.

Andy Hertzfeld puts it this way: "The passion is what distinguishes this team." What pushes them, he says, is a desire "to do something that will be in the history books one day."

History books? The idea haunts General Magic's Mountain View headquarters. Like the Blues Brothers, the Magic people believe they are on a mission from God, only with stock options. As Rich Miller, General Magic's VP of business development, told me, "how many times in your life do you have the chance to be truly at the right place at the right time?" For some Mac veterans at General Magic, it's the second time around—another chance to put a dent in the universe—maybe even a deeper one than the first.

Mystic Crystal Revelation

IN A COMPANY WHERE JOB DESCRIPtions often include the word *wizard*, president and chief executive officer Marc Porat might be considered the Oz-like figure behind the curtain. An intense, articulate baby boomer, Porat was working for Apple Computer in 1989, having come there by way of Stanford, Private Satellite Network, and the Aspen Institute. When Apple gave Porat the task of answering the question "What is beyond personal computing," he quickly realized that the answer lay in communications.

Porat came up with a vision he called the Whole Person Paradigm. At first blush this sounds suspiciously warm and fuzzy, but it actually translates into a useful concept, the idea that people use three kinds of communication: with themselves (things like reminders and agendas), with others (phone, fax, electronic mail), and with the vast supply of knowledge in the world (databases, entertainment). The idea was to come up with a system that would address all three. He figured that the product, code-named Pocket Crystal, should be small, cheap, light, and incredibly easy to use.

Apple's philosopher-king John Sculley liked Porat's idea, but decided that something so broadly based could best be realized outside of Apple. So in 1990, Apple spun off Pocket Crystal as a new company called General Magic, and retained only a piece of the action. The new name came from Arthur Clarke's remark that the best technology is indistinguishable from magic.

Marc Porat had a vision, and a business plan the size of a telephone book. But his most impressive asset was his talent for persuasion. It is no accident that the *Wall Street Journal* called him "a silver-tongued devil." While the project was still at Apple, Porat wooed Bill Atkinson, who is now chairman of General Magic's board. The next convert was Hertzfeld, then Joanna Hoffman, the first marketing person on the Mac team. Soon the company was flooded with world-class talent. But Porat's real test came in cajoling corporate giants in communications and consumer electronics to be part of the General Magic Alliance. After all, there are plenty of companies in Silicon Valley planning small devices that communicate—the winner of this sweepstakes will be the one that sets the standard. The best way to do this is by getting the big guys on your side. It took ten minutes of Porat's gab to bring in Motorola, a giant in chips and wireless technology. A meeting with Sony's CEO brought an agreement in an unprecedented five days. Soon other corporations fell in line—Philips Electronics, Matsushita, and the biggest of all, AT&T.

General Magic tries to make history

Technologies R Us

AT THE PUBLIC UNVEILING OF THE Alliance at a press briefing last February, no products were demonstrated or even announced. Instead, General Magic disclosed that its Dream Team was not so much making things, but devising technologies. Two, to be specific. One is a telecommunications scripting language called Telescript, and the other is a "communicating applications platform" called Magic Cap.

General Magic's plans rest on these two technologies. The first one, Telescript, is particularly interesting in that it did not come out of the personal computer culture, but from the comparatively arcane world of data communications. Its chief architect is Jim White, who has godlike status to those steeped in the lore of communications as the master of the X.400 protocol. Telescript is a language for "smart messaging" based on a giant breakthrough: it treats commands as if they were little computer programs. In this aspect, Telescript very much resembles PostScript, a page-description language that derives its power from the same principle. Smart messaging changes messages into messengers—instead of merely communicating, they go out and find the intended recipient(s), figure out the best way to get the content across, and then collaborate with other messages so that you can have a fruitful exchange without even knowing about it. (Are smart messages a species of software agent? Yes.)

General Magic VP Rich Miller gives an E-mail example. "I send a message saying, 'Get it to him as quickly as possible, and notify me if he receives it. If you can't get it to

continues

him within the hour, fax it to his home number, and notify me that it went through.'" Or consider scheduling. You want to make a dentist appointment. Your smart message to the dentist would not only suggest alternate dates but also get back to you with the day that is open, and then stick the appointment into your calendar. And on the morning of root canal day, it sends you a reminder. Telescript can also use software agents to search databases.

Like PostScript, Telescript does not have a direct interface with the user, but works underneath applications and operating systems. AT&T plans to open an entire new division using Telescript-based devices for smart messaging. There's also talk that IBM is about to embrace this technology. That's just fine with General Magic, because if the company gets its way, Telescript will be a cash cow, licensed to anyone making a telephone, modem, or personal digital assistant.

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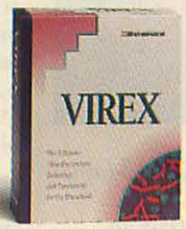

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Circle 37 on reader service card

The Capper

BUT THAT ENTREPRENEURIAL VISION can only be fulfilled by its other technology, Magic Cap. Just as the Mac in its day was ground-breakingly cool, Magic Cap charts 11 on a 1-to-10 coolness detector. Magic Cap even *feels* like the Macintosh, in some part because its visual flourishes are supplied by Susan Kare, the designer responsible for the way the fonts and icons looked on the original Mac.

The problem these magicians face is quite similar to the dilemma Apple tackled ten years ago: how can you allow people to do complicated things (personal computing, smart messaging) in an easy-to-learn, intuitive way? The solution in both cases is to create a sort of visual playground within the machines, a metaphoric outpost of cyberspace populated by icons that are easy to manipulate. While the Mac is standardized on a desktop metaphor, with files, folders, trash cans, and calculators, a desktop is only one possible scenario Magic Cap might offer. There might be shopping malls, libraries, encyclopedias, or neighborhood maps.

Magic Cap has a simple scripting language, like Atkinson's HyperCard. But most people will control Magic Cap devices by manipulating icons. As in Brøderbund's Playroom program, users might trigger an event as easily as by tweaking an on-screen toy. In a desktop scenario, for instance, you might get to your schedule by touching a datebook on a desk. You could start to compose a note by touching a pad of paper, which would prompt a little typewriter keyboard to appear on screen for text input.

Here's another scenario. As if you were playing a graphic adventure game, you might scroll through a representation of a shopping mall. See a record shop? Touch the door to find your way to the blues bin and the new CD by Buddy Guy. Push a few more buttons and you've ordered the CD, which the distributor will automatically send to your home. The purchase might trigger a message that Buddy Guy is playing at Town Hall next week. A few touches in response to the message could change your display to a seating chart of the arena, with unpurchased seats highlighted. You might choose your seats right there. A digital equivalent of tickets, good for admission, would be sent straight to your device. (Encryption technologies built into Telescript would ensure that only those tickets are valid for those seats.)

I could go on with all sorts of examples. At the press launch, an AT&T executive was particularly fond of the scenario in which a guy in a boring business

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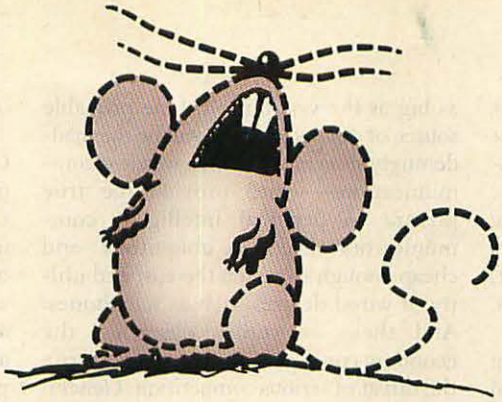

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*For the mice that run on a Mac, you can't call for pest control. But for the mice that run on top of a Mac, and under a Mac, and in the cupboards and stuff, call these guys: Orkin Exterminating.

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meeting sent a digital postcard to his dear old mother, whose General Magic–powered device lit up with an incoming message that brightened the dear lady's day. But suffice it to say that if General Magic manages to complete these technologies as planned, if the Alliance holds together, and if the public accepts the new devices, history will indeed have been made.

Unless of course, it doesn't. Chipping the paint job on the universe is easier said than done. Those three Ifs are big ones, as big as the vision itself. One probable source of disappointment will be the maddeningly slow rate at which wireless communications—which provide the true pizzazz to personal intelligent communicators—become ubiquitous and cheap enough to match the cost and utility of wired devices such as telephones. And there are other obstacles: the economy could get grungier. And there's the threat of serious competition: General Magic borders on phobic at the prospect of Microsoft getting into its business.

But the greatest potential pitfall for General Magic is its burden of insanely great expectations. The company isn't talking, but my guess is that the first implementations of General Magic technology will appear early next year. These will include small devices made by Alliance members Sony, Motorola, Philips, and Matsushita; AT&T's Telescript project; and—good news for Macintosh users—Apple Computer's software implementations for PowerBooks. (John Sculley has also announced that Newton devices will eventually use Telescript.)

Yet until massive numbers of people are actually messaging with Telescript, and until the futuristic telecommunications services I've described come online, General Magic devices won't be nearly as useful as the gee-whiz scenarios suggest. And even if the first implementations use wireless communications exclusively (which seems unlikely), the ongoing costs will be steep. Maybe steep enough to lead a few people to toss their sweet devices into the dumper after the first bill appears.

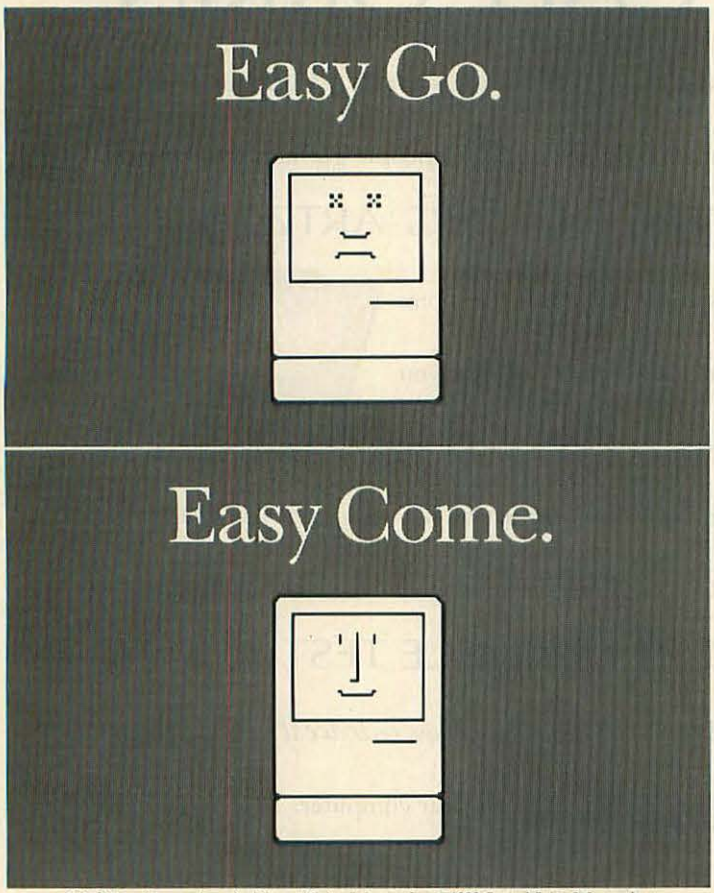
Marc Porat is certainly aware of the perils of unrealistic expectations, and he urges people to expect a slow build. A very slow build. "I'm a walking antidote against hysteria and hype," says he. "I tell people this will take a long time. In some sense I'm working for my kids. We're talking about 20 years of development."

While Porat's kids are reaching majority, their college funds, with luck, will be enriched by General Magic's Telescript licensing fees, and the revenues paid by the early adopters who will use products with Magic Cap even before so-called personal intelligent communications become as common as pay phones. That, in a nutshell, is General Magic's plan. First the vision, then technologies, then the infrastructure. Finally, the history books.

Porat has to leave, and I'm left alone with a prop he brought with him, a nonworking prototype of a potential General Magic device not much bigger than a Sony Walkman. On the front is a representation of an early Magic Cap display; on the back is a little piece that drops out and unfolds into a tiny telephone receiver. Porat, forgetting his role, told me that John Sculley predicted this little thing would someday be in the Smithsonian. So much for being an antidote to hype.

But instead of saying "The Smithsonian? Hoo!" I hold the prototype respectfully, thinking of paradigms, Dream Teams, and digital postcards to my mother. **m**

STEVEN LEVY's most recent book is *Artificial Life: The Quest for a New Creation* (Pantheon, 1992).



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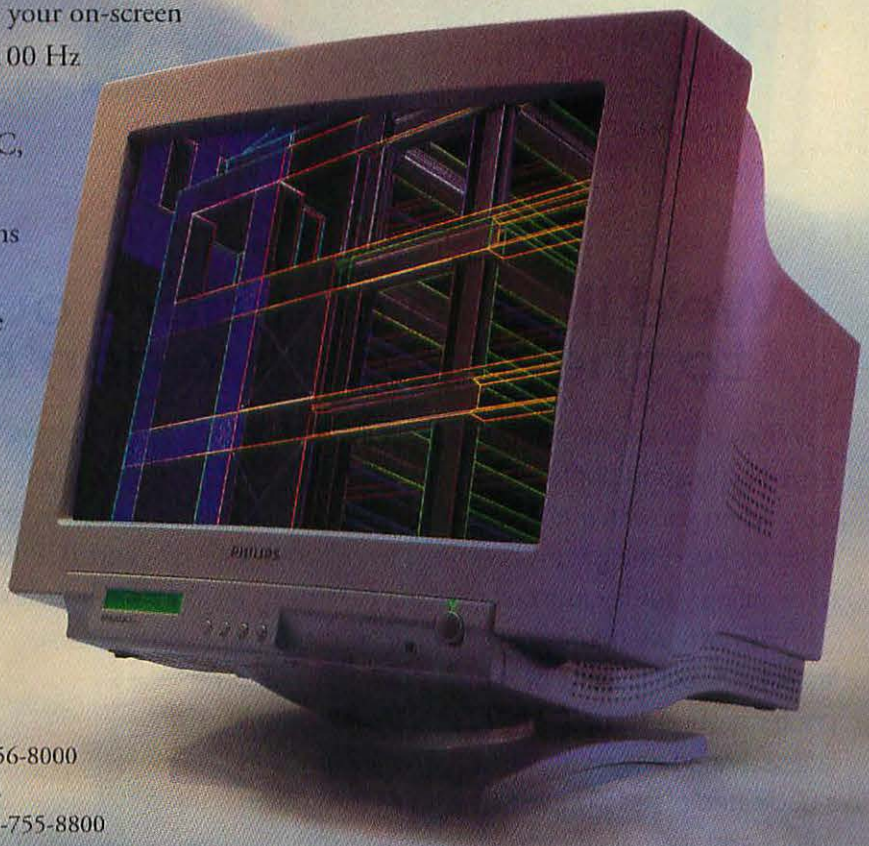

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Circle 143 on reader service card

Apple Revs Up Service and Support

BY DEBORAH BRANSCUM

SLOWLY BUT SURELY, APPLE is getting the message. The company used to offer a 90-day warranty on its products; eventually that changed to the industry standard of one year. For most of the company's history, Apple technical support simply didn't exist; now *Macworld* is getting letters praising Apple for the kind of hand-holding that's second nature to virtually every other company in the industry.

In April the company announced Apple Assurance, a program of improvements in customer service and support. The changes include the addition of a toll-free support line (see "Calling on Apple"), an improved global warranty, and expanded service options. With a proof of purchase, warranties for Apple products will now be honored by any Apple-authorized service provider in the world. That should make life easier for international travelers. (Apple says it's the only company to offer global support across its entire product line.) The company has also expanded its warranty service program to provide on-site repair for most of its computer systems and many peripherals, including scanners, several LaserWriters, CD-ROM players, and all keyboards.

Are these changes real improvements, or simply window dressing? The improvements are real, according to Nicholas Martin, a *Macworld* reader and Apple customer since early 1986. Martin says he hated Apple several years ago because of a broken LaserWriter Plus and its two-month wait for repairs. Martin says the small laser service bureau he opened in 1986 went under because it couldn't function without a printer. Apple's unwillingness to intervene with the dealer repairing the printer destroyed his business, Martin claims.

Fast-forward to the spring of 1993, when Martin's new Quadra 800 began acting up. A misplaced Finder and System caused the problem, which he was unable to fix with Apple's start-up CD-ROM. So Martin went to a dealer, who charged $50 for booting the Quadra from a floppy and cleaning up a few files. Martin then called Apple's new support line and was told by a representative that the dealer "had no business charging me for such simple assistance and that he would make sure they credited me," he says in amazement. The support person "gave the dealer hell and ensured that the dealer gave me my money back."

Why did Apple get religion? Martin claims unbridled capitalism did the trick; responsive companies in the DOS/Windows world had already upgraded support, so Apple was forced to follow suit. That makes sense. But there's more to the story, according to the people behind Apple's new policies: Dan Byrne, vice president of the customer services division for Apple USA; Jackie Whiting, director of customer support; and Timothy Hayes, director of service.

Responding to Customers

ACCORDING TO THESE APPLE EXECUTIVES, about 18 months ago an invisible but important change took place at Apple that should ultimately mean better products and policies. The service and support groups began feeding information back to the product groups that actually create Apple computers and peripherals. Based on calls to its 800 number, the customer-support group now gathers information on the top ten customer issues and shares it with the rest of Apple. The group is also able to track bug reports, erroneous product specifications, and general customer unhappiness on any given topic.

Despite improvements, problems remain

All this information-gathering is useless unless it's acted upon. But Apple is paying attention, say these execs, who point to the Apple Assurance program as proof. For some time Apple has surveyed customer satisfaction. PowerBook owners—who had access to a phone line and mail-in warranty repairs—had far higher customer-satisfaction ratings than other Macintosh owners. That realization led Apple to introduce toll-free technical support for all customers—an overdue and welcome change in customer policies.

"The Apple Assurance program provides the customer with a choice," says Byrne. In the past, customers were restricted to dealers for help, and some, like Martin, got stranded. In those cases, customers now have recourse to Apple. "It's a safety net," says Byrne.

More Change Needed

THIS SAFETY NET IS A HUGE IMPROVEMENT over Apple's earlier stance on service and support. I got through to an Apple rep promptly one morning and got a quick and accurate answer to my question. Initial reports from readers suggest that many are also getting prompt help and are happy with the changes. But Apple needs to understand that true service and support goes far beyond the narrow definition suggested by warranty policies and phone lines.

Here's an example: Technical support alone won't keep customers happy if they have to wait months to buy a product. At the end of May, dealers said the popular LC III (particularly the 4/80 model) and LC III upgrades were in short supply. One dealer had no 4/80 LC III's and hadn't for a month. Such problems aren't new to Apple. In August 1992, Bradley Wilson of Irving, Texas, ordered a PowerBook 170 through the Apple educator program. The 170 was discontinued before his computer was scheduled to arrive, in *October*. He finally got a 180 in mid-March of this year.

Other examples abound. Express Modems for PowerBook Duos were late out of the gate; worse still, they don't work very well, according to several readers and a few dealers. Less recently, a pair of *Macworld* readers ordered a IIvx in October 1992 but didn't receive it until late December—and the cheaper, faster Centris line was announced a mere six weeks

continues

Calling on Apple

Memorize this number: 800/767-2775. That's the number to call for Apple support. It translates into 800/SOS-APPL, for when you need information on getting your Mac up and running, have questions about compatibility, or want details on Apple products. You can talk to real people Monday through Friday, from 6 a.m. to 6 p.m. Pacific standard time, or simply listen to a 24-hour recorded question-and-answer line with responses to common questions. There's also a fax-on-demand system for faxing callers product information. (Call 800/950-2442 for info on fee-based support.)

Apple's general number, in Cupertino, California, is 408/996-1010. Hearing-impaired customers can dial Apple's Customer Assistance Center TDD at 800/833-6223. The company's Worldwide Disability Solutions group can be reached at 408/974-7910. For referrals, call 800/538-9696, ext. 525, to find a user group, authorized dealer, or service provider. Dial 408/974-9627 to be referred to a consultant.

In the United States, APDA (Apple Programmer's and Developer's Association) can be reached at 800/282-2732; in Canada, at 800/637-0029. APDA can also be reached directly at 408/562-3910. AppleLink users can dial the AppleLink Helpline at 408/974-3309 for information on billing, technical support, or on ordering AppleLink or the AppleLinkCD.

Canadian residents have access to Apple's Technical Assistance AnswerLine at 800/263-3394 for one year of support; Apple Canada can also be reached at 416/513-5548 for basic getting-up-and-running support. Or try 416/513-5787 for presale information and for dealing with unresolved service and support issues. For a referral to a Canadian authorized dealer, call 800/665-2775. The general Apple Canada number is 416/477-5800.

Now that Apple offers a global warranty service, travelers to Germany, the United Kingdom, and Japan may want to keep track of these numbers. In Germany, you can dial Apple's general information line at 0130/7978. In the United Kingdom, dial 100 and ask for Freefone Apple to get customer assistance at no charge. In Japan, call 3-54118500 to get Apple's general line. Remember, you need proof of purchase in order to get warranty service abroad.

later. Another reader waited *five months* for his IIvx.

Of course, it's no small trick to plan and build excellent products, accurately predict demand, and then seamlessly produce them. Apple *has* beefed up support, and it appears the people running and staffing Apple's support groups are working hard to help Mac users. But the support people don't set policy. And it's at the policy level that Apple needs to get religion. But that doesn't have to be a problem—by simply following this *Macworld* wish list, Apple can create the Holy Grail of customer service and support. How?

- First, solve the supply problems. Wannabe customers are increasingly frustrated with product shortages.
- By replacing lemon computers. Joseph Borzelleca, a professor of pharmacology at the Medical College of Virginia in Richmond, bought a PowerBook 170 from an authorized Apple dealer in July 1992. The computer's battery never held a charge, according to Borzelleca, who sent it to his dealer once and to Apple for repair a total of five times. Apple execs say the company has made reasonable offers to resolve the problem. I disagree. The company's most recent offer was to replace his

continues

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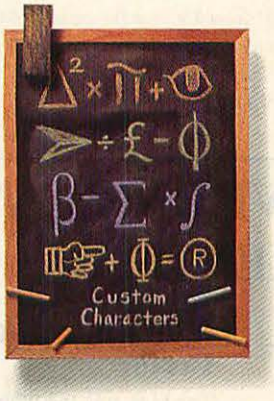

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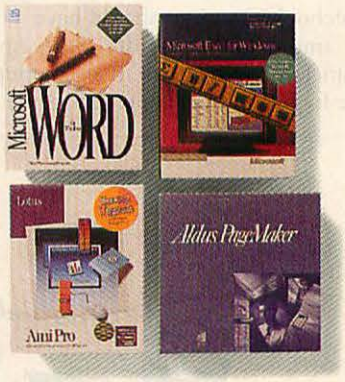

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computer's 120MB hard drive with an 80MB drive and give him a nine-month warranty—if he agreed to keep the offer confidential and waive his rights under California law. Apple should be ashamed of itself—the man deserves a replacement computer. And so do any customers saddled with similar Macs From Hell.

• Speaking of PowerBooks, Apple needs to increase consumer education about the limits of PowerBook technology. *Macworld* continues to get reports of PowerBook screens that have cracked for no discernible reason. This is Apple's response to one distraught customer: "PowerBooks . . . are still limited by the confines of the technologies on which they are built. Therefore, they do need to be handled with care. Apple has not determined what caused the crack in your screen. It could have been caused by some form of impact, something heavy set on the unit, or a wide variance in temperature." The customer in question, Nathaniel Levine of Davis, California, writes that he did not misuse his computer, and when he told an Apple rep that a notebook computer should have a certain amount of durability, "the Apple technician reminded me that computers were fragile and made me feel guilty for ever taking the machine from my desk." Apple, be honest—if PowerBooks are so fragile, warn people as they make a purchase, not after the machine is damaged.

• Apple should deliver on its promises. The Personal LaserWriter NT printer does not support Adobe Multiple Master technology because of a problem in the PostScript ROM. LaserWriter NT owners initially received a notice from Apple that a ROM upgrade was on the way. Then Apple reneged on providing a reasonable fix; NT owners who want to take advantage of Multiple Masters must buy a new printer or pay $1249 to upgrade.

• Apple needs to get the facts right on its product spec sheets and share them with dealers and consumers. Apple shipped some LaserWriter Pro 600s and 630s with 8MB of double-sided SIMMs, for example, but somehow failed to tell dealers that single-sided SIMMs are required for upgrades. It made Claude Bernard of Laurel, Maryland, a trifle unhappy to discover that he'd have to completely jettison the 8MB of RAM in his brand-new printer in order to add more memory.

Service Hero

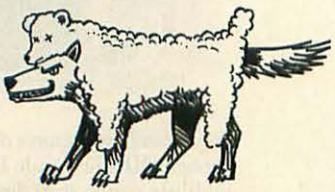
Joe Clark of Toronto sings the praises of Jim Hoskins of CPUsed, a local dealer that buys and sells used Macintoshes. Clark writes that Hoskins "has swapped Radius Pivot monitors with the jitters more than once (costing him real money in repairs) and still is offering me an upgrade to a color monitor for a lousy $250." Not only that, Hoskins has "installed memory and ROMs before my very eyes and never asked for a cent for installation." What a dealer!

Still, Progress Is Progress

CLEARLY, APPLE HAS ROOM FOR IMprovement, but the company is making real progress in improving its service and support. If you agree, tell me why. If you don't agree, let me know. And tell Apple too. After all, Apple representatives are standing by, ready to offer aid. **m**

Research assistance by SUZANNE COURTEAU.

Send nominees for sainthood to *Service Heroes, Macworld,* 501 Second St., San Francisco, CA 94107, or via AppleLink (Macworld1) or America Online (Branscum). Conversely, drop *Conspicuous Consumer* a line if a company is ignoring you.



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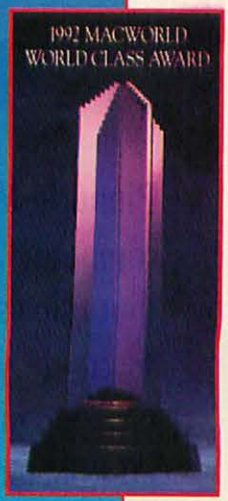

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Lab Notes

Compression Software

BY MARK HURLOW AND MATTHEW LEEDS

FILE COMPRESSION OFFERS THE PROMISE of a lot more storage for a small price, but file compression isn't necessarily for everyone. Compressors change how your Mac works with your data, and that carries several penalties. The feature "Real-Time Compression" in this issue compares five products that promise doubled disk space (as well as three products that were unavailable for full testing) and explains the pitfalls. Knowing how these programs work can help you decide whether the possible pitfalls are worth the savings.

How Compression Works

HANK OSUNA

FILE COMPRESSORS—whether they operate on-the-fly, like those in the feature, or manually, like the popular shareware utilities StuffIt Lite and Compact Pro—rely on a set of mathematical equations (an algorithm) that looks at the sequence of bytes that make up applications and files. The algorithm analyzes the sequence for repetition, and writes a new version of the data that reduces the repetition. For example, the algorithm might reduce the text "Now is the time for the people of the nation" to "Now is&%me for&people of-&na%on"—notice how the repeated text *the* (including the spaces around the word) is replaced with *&* and the text *ti* with %.

Different Compression Techniques

THE KEY DIFFERENCES AMONG PRODucts lie not in the algorithms themselves but in how they are implemented. There are two basic approaches for a compressor to use: file-level or driver-level. Until recently, all Mac compressors were file-level; most DOS compressors are driver-level. The Mac's complex disk-driver structure delayed vendors from using the driver-level approach, which is typically more efficient but makes data recovery more difficult if a disk crashes.

With file-level compression, the application saves data to the hard drive in the normal way: first through the Macintosh Operating System, which handles file naming and folder details, and then through the disk driver, which directs how the bits are stored on the disk. The compression program—an INIT—looks on a disk for data that is uncompressed and, when the Mac is idle for a few seconds, reads the file, compresses the data in RAM, saves the compressed version of the file, deletes the original, and gives the new file the original's name.

A driver-level compressor replaces the disk driver or modifies it so that the way the driver writes data to disk actually changes. Before writing the bits to the disk, the driver first compresses the data. It also stores the bits on the disk in a more-efficient way than a standard Mac driver does (see "Compression Methods' Trade-offs" in "Real-Time Compression" in this issue).

Pros and Cons File-level compression has several advantages over driver-level compression. First, you can remove the compressor by simply dragging it out of the System Folder after decompressing all files. Second, since file-level compression is not an all-or-nothing procedure, you can exclude the applications and documents you use most so that they're always quickly accessible (compression and decompression take time). Third, once a file is decompressed, it acts like a normal file—applications that read and write the file repeatedly while working on them, like Adobe Photoshop, don't waste time compressing and decompress-

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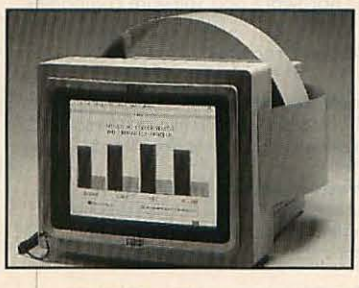

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ing the same file over and over. Fourth, because file-level compression doesn't alter how the Mac keeps track of files or how it allocates resources, file recovery is easier, since recovery software can deal with standard data and file structures.

The major disadvantage of file-level compression is that it requires occasional user intervention, such as changing compression settings to optimize performance and decompressing files before checking them with an antivirus program. Also, since file-level compressors leave the System Folder's contents alone (system files are used so often that the constant compression and decompression would greatly slow down the Mac), file-level compressors typically offer less actual compression than do driver-level products.

Compression Is Unequal

SOME FILES BENEFIT MORE FROM COMpression than others. Word processing and spreadsheet documents usually compress the most, since they typically have many repeated patterns of data. Database documents also compress well, since many of their fixed-length fields contain either multiple blank spaces or data that is repetitive—for example, zip codes.

But scanned color or gray-scale files yield the least to data compression—they're much less likely to contain similar data, and the visual "noise" introduced by the scanning process doesn't help either. Previously compressed files—such as archived data, LZW-compressed TIFF files, and JPEG-compressed QuickTime movies—gain little or no compression.

Resource Compression

APPLE AND OTHER DEVELOPERS, NOT just users struggling with huge files and small hard drives—benefit from another type of compression. While Apple was developing System 7, the System file and Finder grew to the point that they would no longer fit on a single high-density floppy disk. Apple had always used a compression/decompression method on system resources that let compressed system files function while still compressed and without affecting system performance. The trick was hidden from developers until the release of System 7. Now an official method of accessing that resource-compression technique is available.

How Resource Compression Works Each developer can create its own decompression code and store the code with compressed applications as a resource of type DCMP. When you launch a compressed application, the compressed portions are decompressed into RAM. This is much faster than first decompressing to disk. Also, only the resources that are needed at launch time need to be decompressed. Being smaller, a compressed application sometimes loads faster than an uncompressed application, even with the decompression overhead.

Several developers, including Aladdin Systems and Fifth Generation Systems, didn't wait for Apple's official method of using compressed resources, so their methods work both with System 7 and 6.

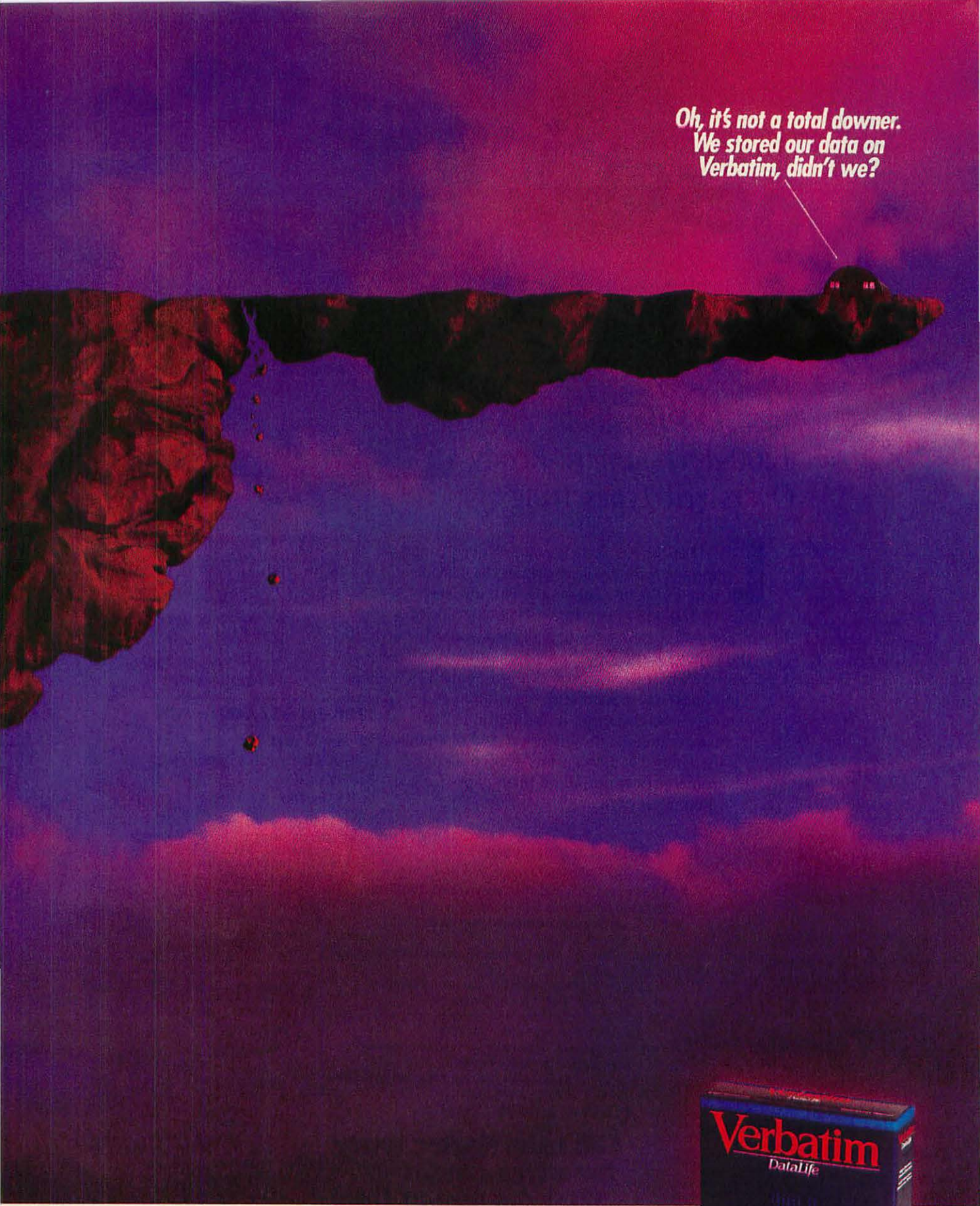
Taking Advantage of Resource Compression AutoDoubler lets users apply its own version of this technique to system resources not originally designed to take advantage of this feature. With the AutoDoubler Internal Compressor (AIC), you can compress applications, control panels, and system extensions.

In our testing, only some applications could be compressed using this method, and only some launched faster than when they were compressed in the normal manner. Still, we found some dramatic improvements. For example, via resource compression, Photoshop took up 60 percent of its normal size and launched only 3 percent slower than in its uncompressed form. Via normal compression Photoshop took up 54 percent of its normal size but took 39 percent longer to launch.

Alternatives to Compression

IF YOU'VE DECIDED THAT THE PERFORmance penalty of on-the-fly compression isn't for you and you can't afford a bigger hard drive, consider some other methods for getting more disk space.

- Don't install every file that comes with the System. When you perform a System upgrade, do a custom installation—install only the files you really need on your hard drive.
- If you have mostly very small files, partition your drive. The bigger the drive's partition, the bigger the allocation block—which is how much space the Mac reserves for each chunk of data. If the file size is smaller than the block size, the unused space is wasted. A 230MB partition usually has 4K blocks; an 80MB partition usually has 2K blocks.
- Use the compression features that are built into some applications—for example, save files as compressed TIFF instead of TIFF.
- Remove tutorial, help, and other support files once you no longer use them. Ditto for unused sounds and fonts (back them up in case you want them later).
- Use an integrated package if you don't need all the features of a high-end package—for example, try Microsoft Works instead of Word and Excel.
- Clean up your hard drive occasionally—you'll be amazed how much room you can recover. **m**



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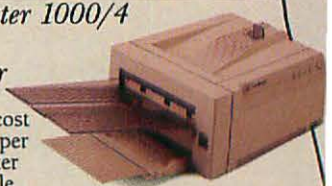

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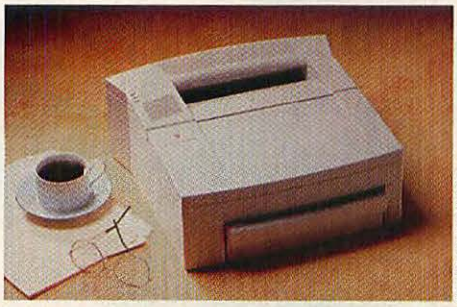
MACWORLD

NEWS

THIS MONTH:
New Spreadsheet •
Omnis 7 Upgraded •
GUI Accounting •
Inexpensive LaserJet •
QuickTime 1.6 •
Pocket Optical Drive

BY DAN LITTMAN AND TOM MORAN

Personal LaserWriter 300: More Gray for Less Green



PAUL FRANZ-MOORE

THE LASERWRITER 300: LOOKS GOOD, PRINTS GOOD (IN GRAY-SCALE, EVEN!), AND PRICED TO MOVE.

THE LC III IS NOT the only example of Apple's new willingness to compete on a price-for-features basis instead of trading on the Macintosh mystique. The latest instance of this trend is the Personal LaserWriter 300, a 4-pages-per-minute, 300-dpi laser printer, designed for home or in-home-office use, with a list price of $700. Contrast that with four years ago, when the comparable LaserWriter IISC was introduced at $2799.

The Personal LaserWriter 300 competes head-to-head with GCC Technologies' Personal Laser Printer II, a longtime price-for-performance champion at $739. And at the street price you're likely to find a few months after introduction, the Personal LaserWriter 300 will be reasonably competitive with Hewlett-Packard's popular DeskWriter ink-jet printers.

The Personal LaserWriter 300 is a QuickDraw printer that ships with 39 TrueType scalable fonts and Apple's driver with GrayShare. GrayShare lets other users access the 300 from an AppleTalk network, but GrayShare's main value in the home will be significantly sharper gray-scale printing (see "New from Apple: 3 Printers & 1 Scanner," *Macworld*, March 1993).

With Adobe Type Manager you can print PostScript fonts, but Apple says at this time it has no plans for a PostScript upgrade (a $599 option for GCC's QuickDraw-based PLP II).

The 300 includes some design features that are likely to endear it to light-duty users. A single 100-sheet cassette holds standard and legal paper sizes. The 300 prints on transparencies or any standard paper stock. There's a straight-through paper path for printing on heavy stock or envelopes (which means no curled envelopes from a curved path). The 300 uses one special toner cartridge—it's a new design—that snaps easily into place and should print more than 2000 standard pages.

One particularly unusual feature is the absence of an on/off switch. As part of Apple's emphasis on energy savings (prompted by the federal government's Energy Star plan) the 300 maintains itself in an energy-conserving standby state, powering itself up only when the Mac tells it to print a document. The whole package, remarkably, weighs only 15 pounds.

Another unusual feature is the parallel port, the connection standard for DOS-based printers. The reason simply is that the Personal LaserWriter 300 is the same printer that Canon makes for the DOS/Windows world; Apple added the GrayShare driver, a parallel-to-serial adapter, and a new case design.

What you don't get at the 300's low price, besides PostScript, is speed—the 4-ppm figure is a maximum. Since in the QuickDraw world the Mac is doing the page-setup computation, complex or dense images will slow down the printer and the Mac. Apple says its market research shows home users average only a few printed pages a day, so it's quite likely that retail price—not print speed—constitutes the critical index for acceptance.

Still, the 300's print quality is very good, the price includes everything you need to start printing, and the unit is compact enough to tuck away neatly on the corner of a small desk. Apple says the 300 will ship June 14.
—CHARLES SEITER

WARD SCHUMAKER

Graphical Accounting Adds Up

State of the Art has announced plans to join Great Plains (see "Great Plains' New Plans," *Macworld News*, February 1993) and RealWorld ("Accounting You Can See," *News*, June 1993) in the high-end market with a graphical user-interface accounting package for the Mac called Momentum.

continues

You can store 21 megabytes* of data on a single 3M Floptical™ diskette—just right for larger graphic, spreadsheet or backup files. Floptical technology is a practical and affordable way to increase your storage capacity—without giving up the convenience of diskettes. And with appropriate host adapter and driver software, Floptical drives are compatible with standard 3.5″ diskettes.

Consider cost and compatibility. You'll see why 21 megabyte Floptical diskettes are emerging as the new standard in high capacity diskettes. It's another reason why more businesses protect important information on 3M brand data storage products than any other brand in the world. For more information and a complete listing of Floptical drive manufacturers call 1-800-888-1889, ext. 46.

The 3M 21 megabyte Floptical diskette.

The bigger the job, the better you'll like it.

*Nominal capacity. 3M 21 megabyte Floptical diskettes require compatible drives.
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3M Reliability

Circle 109 on reader service card

Momentum's point-and-click graphical interface will simplify such tasks as drilling down through accounts—for example, to open up the original transaction for a questionable line in the receivables. Momentum will support concurrent work on multiple databases and provide multiple levels of security.

State of the Art says Momentum will eventually have 21 modules, including some highly application-specific modules for multiple-currency businesses, bill of materials, union payroll reporting, and the like, ranging in price from about $500 to about $1500. The platform also has a BASIC-like language for programming additional functionality. State of the Art, 714/753-1222.—D.L.

TURKEY SHOOT

DESIGN FLAWS NOTED

AutoRemounter for PowerBook 160 and 180 Is your 160 or 180 lonely? Maybe that's the reason, whenever it gets the chance to hang out with its friends on the office network, it chatters so much that the network slows to a crawl. (Solution: Put a cork in it by trashing the AutoRemounter cdev.)

Microsoft Word 5.1 Who says "Smart" Quotes is so smart? With "Smart" Quotes on, if you use a font that has no curly quote marks, Word enters blank spaces instead of straight quote marks.

FileMaker Pro 2.0 If you plan to check the spelling in that inventory database, plan on plenty of mouse-clicking, because FileMaker's user-defined dictionary maxes out at 32K, or about 5000 words.

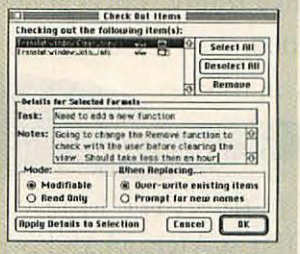
Macworld will send you a Turkey Shoot T-shirt if we shoot your turkey in this column. See *How to Contact Macworld.*

News

TREND

Omnis 7 Speaks SQL

Mac databases are growing up and adjusting to their place beside minicomputer client-server databases like Sybase and Oracle. As proof, this summer Blyth plans to ship Omnis 7 version 2, which the company says is identical on the Mac and under Windows, with new features for a heterogeneous world, including the ability to translate Omnis queries into the de facto standard SQL, and to run multiple databases under one server.



OMNIS 7'S DEVELOPMENT TOOLS INCLUDE A LIBRARY WHERE YOU "CHECK OUT" SHARED MODULES OF AN APPLICATION.

Version 2's development environment creates shared object libraries that provide version control for multiple programmers collaborating on an application, adds a text editor to the scrolling command lists, and can update the end user's application with the latest version at launch. Blyth says that because much of Omnis's feature set is written in its own language, developers can provide end users with subsets of Omnis's features, such as its report generator.

Omnis 7 version 2 will list for $3750 for developers and $3000 for a run-time ten-pack. Blyth, 415/571-0222.—D.L.

Low-Cost Laser Belts Out Color

QMS announced its ColorScript 1000, a color laser printer aimed at the business desktop. This 300-dpi printer has four toner cartridges: cyan, magenta, yellow, and a double-size black. This arrangement reflects what QMS believes will be typical office usage: primarily monochrome documents with a scattering of spot color.

The ColorScript 1000 can push out black-and-white pages at up to 8 pages per minute, and color pages at up to 2 ppm, according to the company. The printer-marking engine places toner on a wide belt in four passes (one pass for each cartridge color), assembles the image on the drum, and then transfers the image to the paper in a single pass.

The printer operates all its interfaces simultaneously (serial, Centronics, and LocalTalk are standard) and automatically switches between page-description languages, according to QMS. The ColorScript 1000 supports Apple's ColorSync and EFI's EfiColor color-management systems and comes with emulations of PostScript Level 1 and Level 2, and of HP PCL 5c with GL/2. In addition, the firmware resides on an included 40MB internal hard drive and is downloaded to memory every time the printer is turned on. The benefit to this is that the firmware may be updated at any time, without requiring a logic-board replacement. According to the company, the printer will retail for under $15,000. QMS, 205/633-4300.—CAMERON CROTTY

ROBERT PERRY

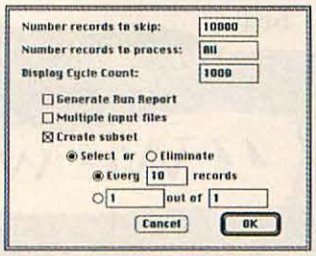
QMS AIMS TO PUT AFFORDABLE COLOR IN YOUR OFFICE DOCUMENTS WITH THIS LASER PRINTER.

Tools to Automate the Mac

A NEW COMPANY with aggressive plans is developing two software packages that automate working on the Mac.

Main Event's Scripter puts a graphical interface on Apple's forthcoming Mac-automation language, AppleScript (see "AppleScript at Last," *Macworld News*, June 1993). Scripter interrogates applications for the AppleScript commands and data objects they provide, and presents the user with a list of commands and relevant options from which to choose. It also provides debugging tools for serious programmers. Scripter will ship for about $250 after AppleScript ships.

The second product, Rosanne (don't ask), is a set of utilities for performing batch-oriented mainframe-style data-processing tasks on unstructured text files. Rosanne's six mini-applications ($500 to $600 for all six), which will probably ship by the time you read this, are Sort, Select, Copy, Match, Aggregate, and Reformat. All are fully scriptable, so a series of data processing tasks can be lined up and scheduled to launch at a later time. Main Event, 202/298-9595.—D.L.



THE OPTIONS DIALOG BOX IN ROSANNE'S COPY UTILITY CAN CREATE A FILE OF EVERY NTH RECORD FROM A SOURCE FILE.

Read my

THE BOTTOM LINE

The HP ScanJet IIc sets a new standard for affordable color scanners. Its engine is fast and well-engineered, and HP's innovative color-callibration software makes hassle-free, "true"-color scans a reality. Prices at less than $2,000, the HP ScanJet IIc is a best buy in its class.

It's blazingly

The HP ScanJet IIc *uses a one-pass scanning method that makes it one of the fastest color scanners we've seen.* It also provides time-saving color previews that dynamically display any changes you make to the scan, such as exposure, hue, and saturation modification.

HP combines its excellent color-calibration technology with one of the best scanning engines we've seen. Our tests for resolution, consistent tracking of the scan head, and color accuracy showed **the HP ScanJet IIc to be a top performer.** In addition

TOP-NOTCH HARDWARE TEAMED WITH INNOVATIVE SOFTWARE MAKES HP'S NEW COLOR SCANNER A WINNER.

1992 Diamond Awards

For an all-around scanner offering high-quality color and black-and-white images, true 400-dpi resolution, and good basic scanning software, **HP's ScanJet IIc can't be beat.**

Hewlett-Packard's ScanJet IIp sets a new standard for affordable desktop gray-scale scanners. From

Top honors in every s

"We were extremely impre

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clips.

fast!

and black-and ... the **ScanJet IIp is an exceptional product.** The scanner is just 16 ... by 1... by

WINNING COMBINATION

To test the HP ScanJet IIc, we used the same set of tests we used for our most recent color-scanner lab report. The results showed **HP's new scanner to be the best in its class in both hardware and software. The ScanJet impresses from the moment you open the box.** Other scanners use a removable screw that locks the scan head for shipping, but HP uses a locking lever that's built into the scanner itself. There's no screw to lose, and the lever is so easy to use that you'll find yourself locking the scan head more often, thereby increasing its life span.

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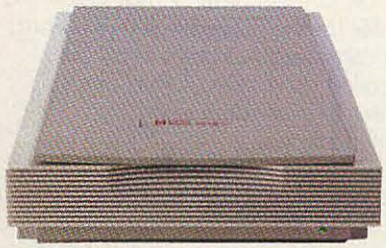
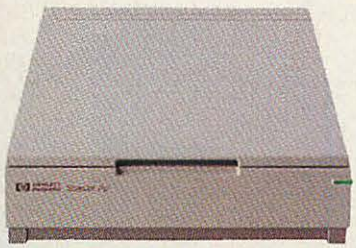
MACWORLD 1992 World Class Award Winner



HP ScanJet IIc



HP ScanJet IIp

We'd hate to brag. So we'll let the Mac press do it for us.

Macworld awarded both the HP ScanJet IIc and IIp their *World Class Award*, and named the HP ScanJet IIc as the *Best Color Scanner* for 1992, and the HP ScanJet IIp as the *Best Black & White/Gray-Scale Scanner*. While *MacWeek* gave their prestigious *Diamond Award* to the HP ScanJet IIc.

Speed. Simplicity. And accuracy were all applauded. It's no wonder. HP's single-pass scanning delivers both lightning-fast speed and precise color registration. TWAIN support allows scanning without having to switch between applications. And HP AccuPage technology with 400-dpi resolution can tackle the toughest OCR challenges. What's more, capabilities this advanced have never been this affordable. List price on the HP ScanJet IIc is just $1,599. The HP ScanJet IIp is just $879. And right now, the HP ScanJet IIc includes Adobe™ Photoshop LE.

Impressed? Don't just take our word for it, or even the Mac press's. Attend one of our scanning seminars that will be held April through September, 1993. To find out more about the HP ScanJet IIc and IIp or seminars in your area, call 1-800-SCANJET, Ext. 7364.*
And judge for yourself.

HEWLETT PACKARD

To the hundreds of thousands of PowerBook® owners who find themselves wishing there was a portable printer that lived up to their Macintosh®...

INTRODUCING THE WRITEMOVE® II PORTABLE PRINTER.

GCC Technologies® has created a printer for the PowerBook that awards you considerable range of motion. It's called WriteMove II: the "biggest" printer to ever come in an incredibly small package.

WriteMove II weighs a scant 2.5 pounds including the battery. It measures just 2"x 3.5" x 11.7." A case could be easily made for buying the WriteMove II on size alone. But that would be selling it short. The ultimate measure of any printer is how well it prints. The WriteMove II will satisfy the most demanding customers. WriteMove II prints near-laser quality 360 dpi on plain paper. It also handles envelopes and transparencies with equal ease. Its on screen print preview saves time. And, background printing permits you to continue working as the WriteMove II quietly prints.

MacWeek and MacUser have cited the WriteMove II as an excellent add-on to the PowerBook, noting its construction, portability, looks, and sophisticated software. MacWeek gave it 4 diamonds ◆◆◆◆ for its overall value.

We invite you to make your own comparisons. Then acquire a WriteMove II: a passport to printing mobility, for wherever life takes you.

And to the tens of thousands of already mobile WriteMove II owners, we say thank you.

At GCC Technologies, developing smart peripherals is our only business. We've got to do it better.

WriteMove II (including battery, A/C recharger, software, serial cable, and one year warranty) $599.

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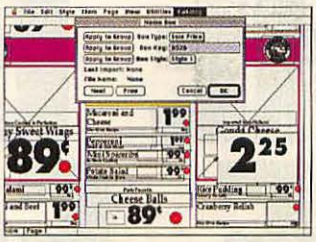


CATALOG MAKER BATCH-APPLYING FORMATS IN QUARKXPRESS TO A GROUP OF OBJECTS IMPORTED FROM A DATABASE.

Catalog producers, large-scale advertisers, and others who produce different versions of multiple-product promotions should find respite from chaos in Integrated Software's Catalog Maker 2.0.

This $2495 Quark XTension allows the page producer to assign a category and ID number to QuarkXPress page elements that are to be updated. Catalog Maker then extracts the appropriate information—text, graphic, price, and so on—from an external product database. The database includes tags to identify each record's function within the ad, and it can also have QuarkXPress Tags for formatting information.

Combined with Integrated's Text Fit XTension (one of five XTensions bundled with Catalog Maker through 1993), the program can automatically adjust text to fit within a given area. For example, it can adjust the size of a price to fit within a starburst. Product DB, also from Integrated, is a $995 4th Dimension database optimized for working with Catalog Maker. Integrated Software is in New York at 212/545-0110.—STEVE ROTH

Fiber-Optics File Transfer

Q: WHEN IS A NETWORK not a network? A: When it's a dedicated, point-to-point file-transfer line. Retriever Plus, Augment Systems' new hardware-and-software file-transfer package, runs over fiber-optic cable but avoids many of the usual hassles that accompany a network, fiber-optic or otherwise. Users plug a NuBus board into a Mac on each end of the transfer line, run Augment's proprietary application, and designate a single folder on each end as a transfer folder. To send a file, a user brings up the Retriever Plus software, selects a file, and clicks on Send. Users can also retrieve any file that is placed in the transfer folder on the other end.

Augment Systems emphasizes that the Retriever system is not a replacement for a network, but rather a way for Macintosh users to transfer extremely large files from computer to computer. The Retriever Plus application occupies roughly 2MB of RAM and must be on both Macintoshes. The company claims that Retriever Plus can transfer a 30MB file in 20 to 30 seconds.

Each NuBus board (at least two are required) costs $1900, a 25-foot cable costs $200 (longer cables are available, up to the operational limit of 500 meters), and the software site license costs $800. Augment Systems, 617/271-0230.—CAMERON CROTTY

HP LaserJet under $1000

SCOTT PETERSON

HEWLETT-PACKARD INTRODUCES THE LASERJET 4ML AT LESS THAN $1000 AND UPS THE ANTE IN THE LASER PRINTER WARS.

INTRODUCED ON May 3, the 4-ppm, 300-dpi LaserJet 4L replaces the LaserJet IIP+ as the most affordable Hewlett-Packard laser printer. A Macintosh version, the LaserJet 4ML, will follow in the second half of 1993 with a street price under $1000. The LaserJet 4ML uses a Canon engine, a 20MHz Intel 80960 RISC processor, 4MB of RAM, PostScript, Intellifont, and TrueType fonts. The LaserJet 4ML supports simultaneous use on a Mac and PC, automatically switching between LocalTalk and parallel ports, and PCL 5 and PostScript Level 2 as needed. Hewlett-Packard, 800/538-8787.
—OWEN W. LINZMAYER

BUG REPORT

Ofoto 2.01 Crashes if you try to save line art as an EPS file. Light Source is working on a bug-fix, to be available free to registered owners.

StuffIt SpaceSaver 1.04 The feature that suppresses decompressing files when backing up doesn't work with Retrospect Remote 2.0. Aladdin says SpaceSaver 1.05, available free to registered owners, will work properly.

MacWrite Pro Using the table editor on a Classic under System 6.0.7 or 6.0.8 crashes your Mac. Claris will make a patch available free via the online services.

MACWORLD* WILL SEND YOU A BUG REPORT T-SHIRT IF YOU ARE THE FIRST PERSON TO INFORM US OF A SERIOUS, REPRODUCIBLE BUG THAT WE REPORT IN THIS COLUMN. SEE *HOW TO CONTACT MACWORLD.

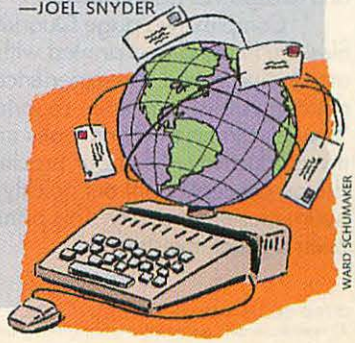
TREND

Universal E-mail Is En Route

In 1988 the worldwide authority on computer communications, the Comité Consultatif International Téléphonique et Télégraphique (CCITT), published the X.400 family of standards that established a way for electronic-mail systems to talk to each other over local area and wide area networks. X.400 supports different types of messages and allows transfer of attachments, such as Macintosh programs and data files or universally understood ASCII text files.

As with most standards, X.400 has taken hold very gradually. In fact, there aren't yet any Macintosh E-mail systems based entirely on X.400. Isocor Corporation (310/476-2671) hopes to change all that later this year with its Isopro for Macintosh, the first commercial X.400 client software for the Macintosh.

Until then, Macintosh users eager for X.400 services may want to look into Inter-Con Systems' (703/709-5500) new Dispatcher/MacX.400 for QuickMail ($995), which works with Apple's MacX.400 server to pass QuickMail messages into an X.400 E-mail network. The Wollongong Group's (415/962-7100) Pathway Messaging for Macintosh ($195) also provides X.400 mail features between Macintosh users when it's used with Wollongong's Pathway Services, a Unix-based mail server. And due out from StarNine Technologies (510/548-0391) by the end of 1993 are Mac X.400 gateways for QuickMail and Microsoft Mail.
—JOEL SNYDER



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The SelectPress *600* offers true 600 x 600 dpi resolution with all the latest advances in laser printing technology. It delivers the highest quality output of any GCC laser printer, ever. GCC's new microfine toner produces smaller dots and crisper edges than previously possible. SelectPress *600* incorporates precise laser optics with a small laser spot size and a vibration dampened paper path to ensure optimal print quality every time you print.

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At the heart of the SelectPress *600* is an incredibly powerful RISC processor and 8 MB of RAM, plus a fast internal hard disk drive for font storage.

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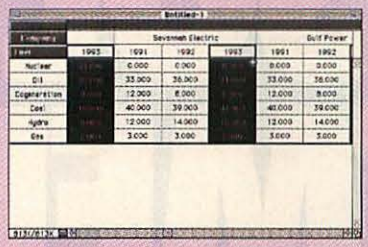
TREND

Smart Spreadsheets



FLIPPANT. MEMBERS OF YEAR AND FUEL CATEGORIES CAN BE SELECTED FOR MEMBERS OF THE COMPANY CATEGORY.

Spreadsheets just store numbers in a grid; it's up to the user to design them so that row and column labels identify data in the cells. Spreadsheets make it easy to set up models but tiresome to rearrange data. In contrast, category-based modeling programs know what a given number represents—for example, sales of refrigerators in the Midwest for winter 1993—which makes it easy to create different summaries and views of the data. Lotus Improv introduced category-based techniques on the Next and Windows platforms, and Objective Software's SpreadBase brought them to the Mac (see *Reviews*, *Macworld*, May 1993).

SofTeam's Flippant is a new category-based spreadsheet with several surprises. It's fast and small (approximately 200K), and it's unfinished. $129 buys you the beta version with a short list of known bugs and another list of uncompleted features, including tool palettes, charting, color, and Apple events. SofTeam expects customers to tell it which features to finish, and will send beta users the final version at no charge. Flippant promises significant features, such as up to 32 English-language categories per spreadsheet, self-explanatory formulas (such as Profit = Sales – Cost), and in-cell editing. SofTeam hopes that this novel mode of researching its market and financing Flippant's development, combined with Flippant's easy fit on a PowerBook, will bring category-based modeling to more Macintosh users. SofTeam, 404/304-2025.

—CHARLES SEITER

News

Radius Launches Video and Graphics Boards

RADIUS HAS JOINED the digital video battle with VideoVision Studio, a single NuBus board that does 30-frames/60-fields-per-second capture and playback of 24-bit QuickTime video. The package is actually the company's VideoVision board with the Studio part piggybacked on an H-Bus connector. The product features JPEG compression; NTSC, PAL, and S-Video input/output options (via an external breakout box); and support for screen sizes up to 1152 by 870 pixels at 8-bit color (640 by 480 in 24-bit color). VideoVision Studio comes bundled with Adobe Premiere and VideoFusion at a price of $4499; current VideoVision Studio owners can upgrade their systems for $1999.

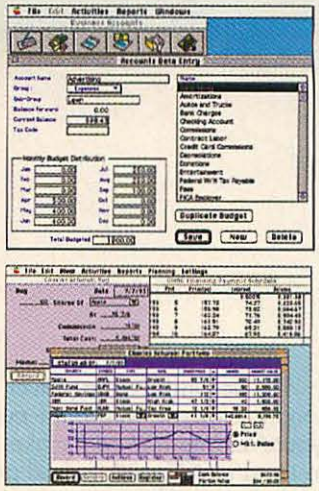
Also new from Radius is PrecisionColor Pro, an updated 24-bit graphics board. The board features on-the-fly resolution switching, supports screen sizes up to 1152 by 870, and at 7 inches long, will work with any NuBus-capable Mac. VideoVision Studio $4499; the PrecisionColor Pro's price was not set but was expected to be less than $2500. Radius, 408/434-1010.—CAMERON CROTTY

Small-Business Accounting on a Shoestring

People running small businesses on the Mac have a new accounting program and an upgrade of another popular program to consider. The upgrade is version 4.0 of Quicken ($69.95), the personal-finance program that many small firms use to keep the books. The latest version includes a portfolio manager, automated entry of credit card charges (if you use a special Visa card), financial-planning calculators, charting, and a way to instantly zoom in on the figures behind report items. Quicken owners can upgrade for $29.95.

M.USA, publisher of CashBiz, hopes to woo Quicken customers with features geared to small businesses. CashBiz's advantages over Quicken include double-entry bookkeeping, invoicing, and an address book for customer lists. At $49.95, it's also less costly than Quicken. CashBiz imports and exports Quicken files and works with Quicken checks. Owners of other Macintosh accounting products can purchase CashBiz for $20 (plus $7.50 shipping and handling). Intuit, 415/322-0573; M.USA, 214/386-6100.

—SCOTT BEAMER



TOP: CASHBIZ'S ACCOUNTS SETUP WINDOW. BOTTOM: QUICKEN 4.0'S INVESTMENTS AND LOANS FEATURES.

60-Field Video at Last?

SO FAR, PRODUCING broadcast-quality video on a Macintosh has been a bad joke to video professionals. They have seen a parade of developers promise a studio in a box (or on a board), only to bring the same 30-fields-per-second technology to market (a field equals one half of a video frame). Data Translation is making some familiar claims about its new digital video product, Media 100, but the company is also using terms that promise performance more in line with the needs of video professionals, specifically, 60-fields-per-second output; 4-track, 16-bit sound; and a price just under $12,000. According to Data Translation, users will be able to digitize video in real time (15 minutes per gigabyte at the highest quality level), edit clips, and then print back to tape or export an Edit-Decision List (EDL) in a number of different formats.

Data Translation has also licensed Adobe's Premiere plug-in software architecture. Media 100's editing software ships with 50 Adobe Premiere video effects and will be able to use any future Premiere effects, including those that support CMX EDL output.

DATA TRANSLATION'S MEDIA 100 WALKS THE WALK AND TALKS THE TALK, BUT WHAT WILL VIDEO PROS THINK?

Media 100 consists of two NuBus boards and the proprietary editing software. The product will require a Quadra 800 or 950 and a hard drive with an 11-millisecond or faster access time that can sustain a 3MB-per-second data rate. At press time, the company was planning to ship Media 100 in August at a list price of $11,995. Data Translation, 508/460-1600.

—CAMERON CROTTY

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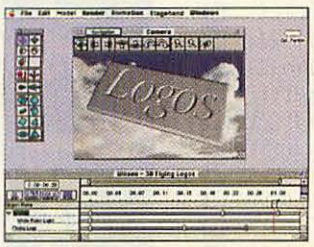
Bargain-Basement 3-D Animation

SPECULAR INTERNATIONAL is developing an easy-to-use 3-D modeling and animation program that it intends to release this fall at a street price of about $100—less than one-third the price of any other Macintosh animation package available. Named LogoMotion, it will come with an extensible library of already animated, editable objects—for example, balls bouncing and pins juggling. LogoMotion will also have a library of cameras with different views (wide-angle, fish-eye, and so on) as well as different movements (panning, swooping, and so on), and a limited rendering engine. Specular's flagship product, Infini-D, can import LogoMotion files. Specular, 413/549-7600.
—GIDEON YAFFE



SPECULAR'S LOGOMOTION COMES WITH PREANIMATED PATHS TO WHICH 3-D OBJECTS CAN BE ATTACHED.

Breakthrough Graphics Technology

Advanced Imaging S.A., a small French company, has developed a breakthrough graphics technology called Functional Interpolating Transformation System (FITS), which lets Macintoshes manipulate, scale, and zoom huge high-resolution, tabloid-size images at speeds surpassing those of fast workstations. For instance, in a demonstration, placing, scaling, and rotating a 100MB file took about five seconds.

FITS is resolution independent; it doesn't record and manipulate images pixel-by-pixel, as do most graphics programs. Instead, FITS works on a mathematical model of the file. When the image is complete, the user requests a final version at any size and resolution, and FITS rasterizes the output to order.

A $5000 application based on the new technology, called Live Picture, was scheduled to be released in France in May, with a less-costly U.S. version to follow in June. The company plans to license the FITS technology to other Mac developers. HSC Software, which publishes a collection of Photoshop plug-ins called Kai's Power Tools, plans to release a FITS version of KPT by late summer. Price was not set at press time. Until Advanced Imaging completes its move to the United States, the company can be reached through HSC at 310/392-8441.—TOM NEGRINO

VIRUS WATCH

CURRENT VIRUSES, TROJAN HORSES, AND WORMS

INIT-M

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 8/93
INFO: Only functions under System 7; infects applications and various system files; can spread at any time; destructive impact occurs on any Friday the 13th
IMPACT: Renames files and folders; changes creation and modification dates; changes file type and creator

Christmas Virus

TYPE: HyperCard virus
FIRST LISTED IN VIRUS WATCH: 7/93
INFO: A HyperCard script that infects the Home card and spreads to stacks
IMPACT: Nondestructive but can cause HyperCard to quit; may slow the Mac to a crawl

INIT 17

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 7/93
INFO: Infects applications and System file
IMPACT: May damage some files; sometimes crashes Mac Plus and SE

Apple Upgrades LaserWriter Driver

Version 8.0 of the Apple LaserWriter printer driver will improve performance of PostScript-compatible LaserWriter printers, especially those that support PostScript Level 2 (currently the Personal LaserWriter NTR and the LaserWriter Pro 600 and 630).

The driver, which shipped in April, also adds support for multiple paper trays and printer resolution via PostScript Printer Description files (PPDs). Third-party manufacturers will customize the driver to their specific printers.

Apple began shipping the driver with PostScript Level 2 LaserWriters this spring, and Adobe sells it under the brand name PSPrinter version 8.0, for $24.95. Current LaserWriter owners can buy the LaserWriter printer driver from Apple for $24.95 (800/769-2775, ext. 7873). Apple Computer, 408/996-1010; Adobe Systems, 415/961-4400, 800/833-6687.—CAMERON CROTTY

Direct-to-Plate Laser Printing

QUICK PRINTERS AND in-house printshops with large-format laser printers now can render Mac documents directly onto plates for printing on small offset presses. Poly-Pro Laser Plates, which come in sizes up to 12 by 20 inches, last for about 15,000 printed pages. The polyester-based plates cost 72 cents per square foot, or about 90 cents for an 11-by-17-inch plate. The maker also sells oversize paper trays and extra-wide laser printers. Printware, 612/456-1400.
—NANCY E. DUNN

TODD BUCHANAN

IN-HOUSE PRINTERS AT PENNSYLVANIA-BASED FEDERATED GENETICS LOAD LASER-PRINTED PLATES ON THE PRESS.

News

New Tools for Navigating Data

Informix Software, a major supplier of corporate relational-database software, hears plenty of complaints about the difficulties users have navigating large, complicated corporate databases. Two new Mac products due out at the end of 1993 may help solve these problems.

WARD SCHUMAKER

Informix ViewPoint, which will cost about $800, is a graphical end-user tool for generating reports and creating forms. It lets users build SQL queries and attach them to forms, with no need for the user to learn SQL syntax or even see the actual queries.

ViewPoint gets its information from the corporate database through SuperViews, a feature of ViewPoint that's also found in the new version of Informix-DBA, Informix's MIS administrators' tool (about $2500). SuperViews are MIS-designed subsets of the corporate database that typically span many tables with many connections. For example, the database administrator can give ViewPoint users in accounting a SuperView of relevant financial data; the accounting staff can find what it needs (and only what it needs) through ViewPoint without detailed knowledge of, or access to, the database structure. Informix Software, 415/926-6300.
—CHARLES SEITER

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Harland Anderson - Computer Consultant

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Circle 106 on reader service card

Portable Optical Drive

FUJITSU COMPUTER Products of America has released the DynaMO, a portable magneto-optical disk drive. Roughly the size of a paperback novel and only 1.2 pounds, the drive uses standard 3.5-inch 128MB MO cartridges, which cost about $55 each. The drive itself lists for $1225. It supports SCSI-2 and has an average access time of 38.5ms and a data-transfer rate of 1.09MB per second.

Designed for the publishing, graphics, and multimedia markets, the DynaMO will compete with removable hard drive media like the new 105MB 3.5-inch SyQuest cartridges. Magneto-optical drives tend to be cheaper and more reliable than removable hard drives but are also generally slower.

Fujitsu is selling the DynaMO as a portable unit, although it cannot be battery-powered. Its case is platinum, like desktop Macs, not granite like the PowerBooks. (For more on alternative storage products, see "Choosing a Storage Strategy," in this issue.) Fujitsu, 408/432-6333.

—JOANNA PEARLSTEIN

Apple's Portable CD Power

The PowerCD from Apple Computer is a lightweight, portable CD player that plays CD-ROM discs, audio discs, and both single and multisession Kodak Photo CD discs. Mobile computer users in particular will find the PowerCD an attractive option, because you can run it on batteries and break it into two pieces that fit in a briefcase. For desktop use, an AC adapter will be included.

LUIS DELGADO

APPLE'S POWERCD PLAYS CD-ROM, AUDIO, AND PHOTO CD DISCS ALL FROM ONE SMALL PACKAGE.

When connected to a desktop Mac or a PowerBook, the PowerCD works as a CD-ROM drive in the usual way. With a Macintosh running QuickTime, the Power CD can easily access the digitized images on Kodak Photo CDs. The PowerCD can also display Photo CD images when connected to a television, using the included CVBS cinch-style video cable. The PowerCD remote control enables users to view, zoom in on, rotate, and crop images on the television. Finally, the PowerCD can play audio CDs when connected either to a Mac or to a stereo system.

The PowerCD uses a Philips mechanism with an average access time of 550ms—less than special speedwise, but a disk cache can improve performance. Apple expects to begin shipping this summer at a list price of under $500.

—WENDY SHARP

DESKTOP LIBRARIAN

Shooting Mac Troubles

This month we glance through two books on troubleshooting the Mac.

- *Help! The Mac Answer Book,* by Steven A. Schwartz (1992, $14.95). This book takes a helpful approach for beginners that includes methods of running your system more safely, as well as tips on solving common glitches. Chapters cover system software, disks, files, printing and fonts, the display, input devices, applications, and modems. Also gives advice on using technical support and a list of troubleshooting tools. Includes an index. Alpha Books, 800/428-5331.
- *Troubleshooting Your Macintosh,* by Douglass High (1992, $29.95). Billed as "the complete, hands-on guide to upgrading and maintaining your Macintosh," this book gives clear explanations of both simple and more technical problems. Each chapter ends with common problems and possible answers. Chapter topics range from the art and science of troubleshooting through all the usual problem areas, tools of the troubleshooting trade, safety, transferring files between Macs and DOS machines, preventive maintenance, and warranty service. Includes a glossary, an index, and an appendix on error codes and another on resources. M&T Books, 800/533-4372, 800/356-2002 in California.—T.M.

SCOTT PETERSON

HELP! THE MAC ANSWER BOOK, AND TROUBLESHOOTING YOUR MACINTOSH.

Do-It-Yourself RAID

TRILLIUM RESEARCH has released Remus, a software package that offers users increased storage speed and data reliability via a redundant array of inexpensive disks, or RAID. The product supports traditional RAID SCSI controllers from companies like Atto, Loviél, and Sixty Eight Thousand, but it also supports the Mac SCSI port, meaning users can create their own arrays simply by daisy-chaining several SCSI drives.

Users can choose between RAID levels 0, 1, 4, or 5—at Level 1 and above, systems can sustain the failure of a single drive without losing data from the RAID. After the drive is replaced, the software rebuilds the data in the background, eliminating system downtime. Remus consists of a system extension and a set of drivers for different SCSI controller boards, and it has a list price of $795. Trillium Research, 715/381-1900.

—CAMERON CROTTY

News

Reconfigurable Documents

Like modular office systems, SGML documents are made to take apart and reassemble in different forms. Electronic Book Technologies' DynaText provides tools to recast such documents in another form.

SGML, or Structured Generalized Markup Language, is an emerging standard that assigns a tag to every element in a document (headlines, figure captions, body text, and so on) to describe what the element is and where it fits in the hierarchy of elements. DynaText can assign formatting to

DYNATEXT DISPLAYING SGML-TAGGED TEXT IN A TECHNICAL MANUAL THAT IS STILL UNDERGOING REVISIONS.

tags in SGML-tagged text—instantly converting every figure caption to 10-point Helvetica, for example, or centering every chapter heading.

DynaText is more than a system for manipulating SGML tags, however. It provides programming tools to create sophisticated data-navigation interfaces for information distributed on CD-ROM or online, and supports hypertext links, raster and vector graphics and other external data types, complex text searches, and other features. DynaText version 2.0 is due to ship this summer. Pricing depends on number of users and distribution method. Electronic Book Technologies, 401/421-9550.—D.L.

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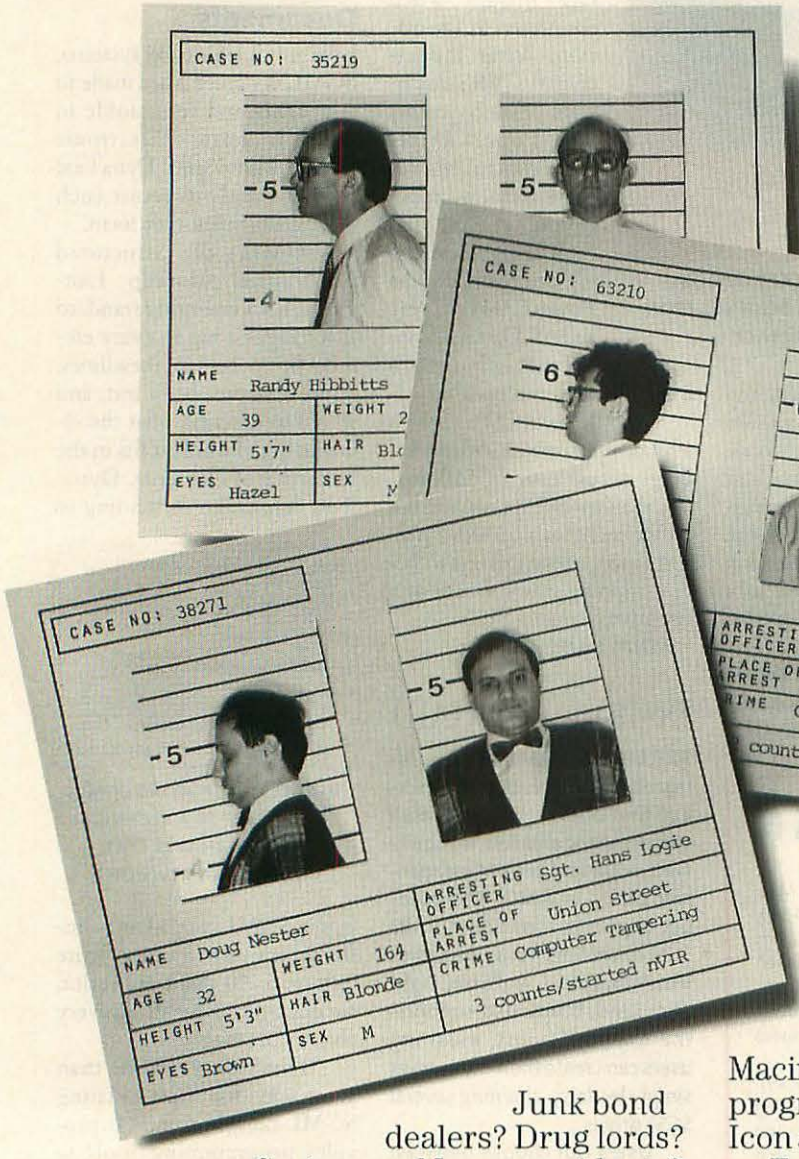

Junk bond dealers? Drug lords? Savings and Loan presidents?

Nope, they're computer hackers. And judging by their physical appearance, you wouldn't think you'd need any protection from them. But you do. Or rather, your computer does.

And to keep these criminally minded people from infecting your files, floppies and various software programs, you need SAM 3.5 anti-virus software.

You see, SAM will constantly monitor for 14 suspicious viral activities. Which is more than any other anti-virus program on the market. And it's the only program that will scan compressed files in System 6 and 7.

So basically, if your Mac has a virus, SAM will detect it, get rid of it and repair the file. And if your Mac is virus-free, SAM will help to make sure it stays that way. Because it monitors your Mac transparently, working behind the scenes, and only interrupting when a virus is found.

What's more, SAM is simple to install on a Macintosh networking* system, as well as a single-user Macintosh. All you need to do is load the program disk, double-click on the Installer Icon and let SAM do the rest.

For the most anti-viral protection, pick up SAM 3.5 at your local retailer. It's the most popular anti-virus program in the world, and will keep you from ever having to deal with this ugly crime. Or these ugly criminals.

SAM™
Symantec AntiVirus for Macintosh
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News

THE AMCOEX INDEX OF USED MAC PRICES

Machine/RAM/Hard Drive	Average Sale Price	Monthly Change
Mac SE/2MB/20MB	$550	–$50
Mac Portable/1MB/40MB	$650	–$50
PowerBook 100/4MB/40MB	$1000	$0
PowerBook 140/4MB/40MB	$1500	–$50
Mac Classic/2MB/40MB	$600	–$50
Mac SE/30/2MB/40MB	$925	–$150
Mac LC/2MB/40MB	$700	+$50
Mac II/4MB/40MB	$900	–$50
Mac IIsi/3MB/40MB	$1000	+$25
Mac IIcx/4MB/80MB	$1300	$0
Mac IIci/4MB/80MB	$1900	+$50
Mac IIfx/4MB/80MB	$2000	–$250
Apple 12-inch B&W display/board	$125	$0
Apple 13-inch RGB display/board	$400	$0
LaserWriter Plus	$625	–$75
LaserWriter IINT	$1000	–$75

Index provided by the American Computer Exchange of Atlanta, Georgia (800/786-0717); it reflects sales during week of May 14. Configurations include keyboard and exclude monitor and display board for noncompact models.

Note to Our Readers:

"Top Fifteen Business Software Packages" will be back next month.

Apple Fine-Tunes QuickTime

VERSION 1.6 of QuickTime promises improved performance, sound, and graphics. Movies will play back about 10 percent faster, thanks to a new Sound Manager (version 3.0), and owners of third-party sound boards will be able to record and play 16-bit (CD-quality) sound from QuickTime movies. Finally, QuickTime 1.6 will support any color level, from black-and-white to 32-bit color, as well as Apple's ColorSync color-matching system, to help ensure that movie colors remain the same from system to system. Apple plans to bundle QuickTime 1.6 with the System 7.1 upgrade kit and with all new Macintoshes. In addition, Apple plans to distribute QuickTime 1.6 via bulletin boards, user groups, and bundling with third-party applications. Apple Computer, 408/996-1010.

—CAMERON CROTTY

Let Us Now Praise Famous CD-ROMs

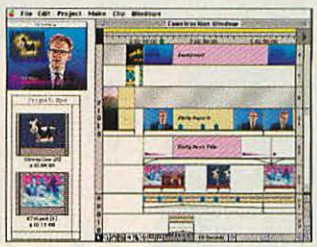
Whether you're looking for a QuickTime clip of Mercedes-Benz's experimental C-Series cars, footage of FDR, or scenes of gas-mask drills, you can probably find what you need in the WPA multimedia collection. The WPA Film Library is one of the world's largest film and video archives, and the parent company, Maljack Productions, has formed a separate divison to make the WPA archives available in digital format. The new division, MPI Multimedia, released the first four CD-ROM collections in April: The Archives of History; Cars! Cars! Cars!; Wild, Weird & Wacky; and WPA Multimedia Sampler. These are $79.98 each. MPI Multimedia, 708/535-1540.—CAMERON CROTTY.

JUST IN CASE YOU NEEDED A QUICKTIME MOVIE OF A STRAWBERRY FACIAL, MPI MULTIMEDIA HAS ONE.

Adobe Premiere 3.0 — Polishing the Apple

Ever since Apple announced QuickTime, desktop digital video has been the darling of the Mac market. Similarly, Adobe Premiere has been the darling of the Mac desktop video market. With Premiere 3.0, Adobe adds new tools and further refines the interface.

The most noticeable addition appears just after the splash screen: a dialog box that lets you choose compression settings, frame size, and frame rate from a list of preset style sheets. Each combination optimizes the program for a different video goal (briefly explained in a help box), and more-advanced users can create and save customized style sheets. Adobe is also promising custom style sheets for individual video-capture boards.

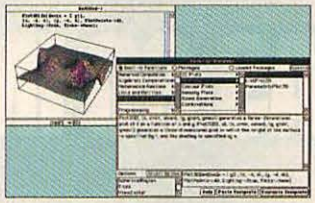


ADOBE PREMIERE 3.0 CONSTRUCTION WINDOW. DISPLAYING CLIPS WITH ONLY A SINGLE THUMBNAIL IMAGE AT EITHER END SPEEDS UP SCREEN REDRAWS.

Both advanced and novice video editors will also appreciate the addition of 97 video and audio tracks, an improved title window (including gradient fills, text-motion, and drop-shadow features), batch-digitization options for grabbing multiple clips, and more-accurate audio-track editing (larger wave sizes and unlimited markers). Clip management has also improved; users can view clips by name only in the construction window (no more waiting for eternal thumbnail redraws), attach comments and labels to clips, and sort clips by label.

Finally, in a nod to the less-than-perfect world of video digitization, Adobe has included an oscilloscope-style Waveform Monitor and Vector Scope for tweaking the incoming video signal. Premiere 3.0 is currently available for $695. Adobe Systems, 415/961-4400.

—CAMERON CROTTY



A THREE-DIMENSIONAL PLOT IN MATHEMATICA 2.2. TO THE RIGHT IS MATHEMATICA'S NEW FUNCTION BROWSER.

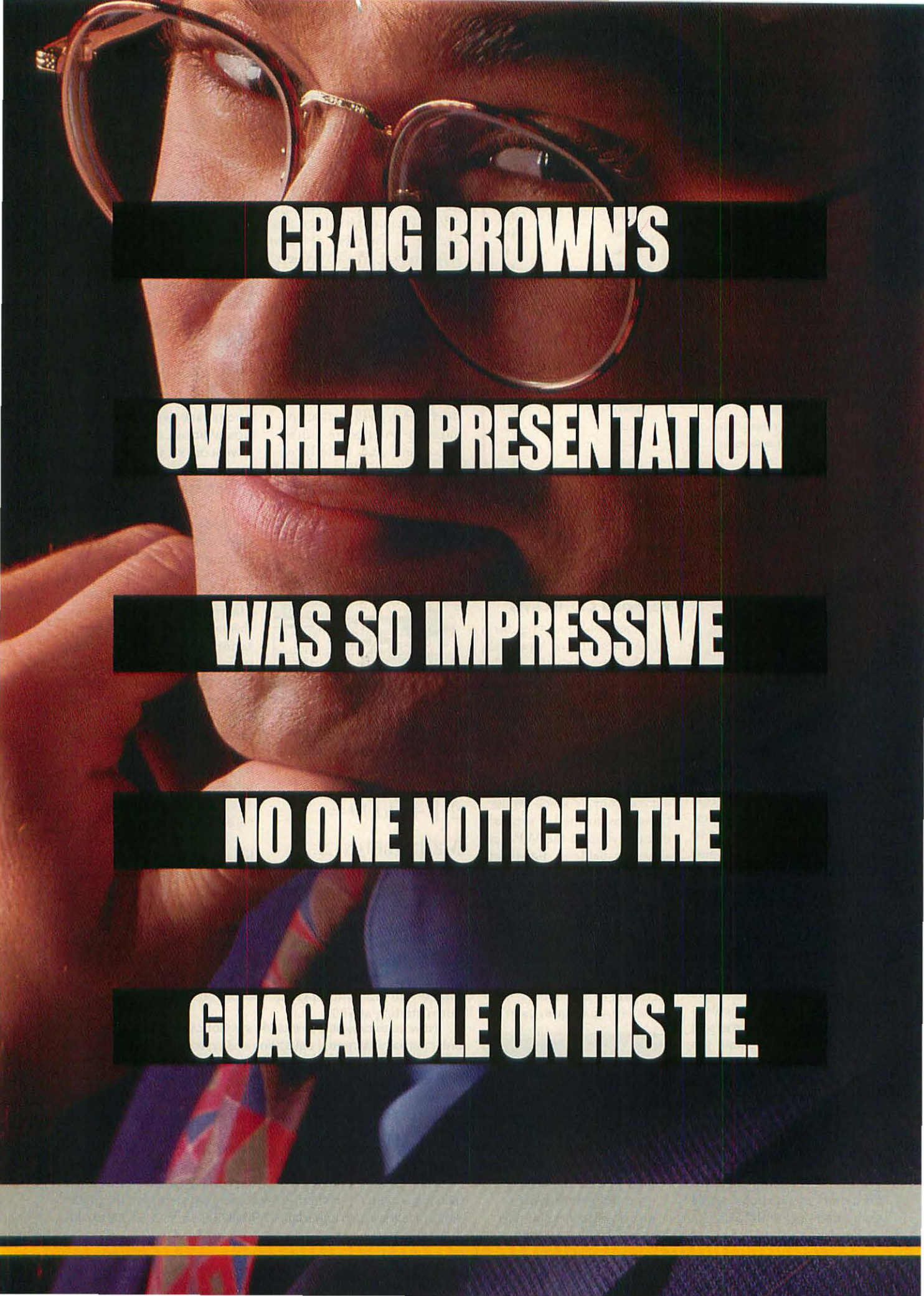
2.1 + 2000 = Mathematica 2.2

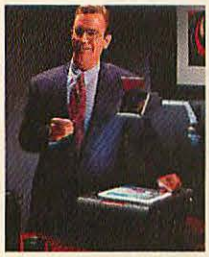
THE NEW VERSION of Mathematica ($595) contains more than 2000 enhancements and corrections and many major new features. In the modest view of Wolfram Research, this calls for the version number to be raised from 2.1 to 2.2, with upgrade prices starting at $50.

New math capabilities include symbolic solution of both first-order partial differential equations and systems of nonlinear ordinary differential equations (at least for the nonlinear systems that have simple symbolic solutions). There are also new modules for calculus of variations, elliptic integrals, and splines, and for making 3-D contour plots of imported data. The program's sound module adds real music capabilities.

The really important addition, however, is the Function Browser, scrolling hierarchical lists of functions, which are briefly explained. Users can select a function to paste or edit. What an improvement over the version 2.1 method: careful typing with a copy of the Mathematica text open in one's lap. Wolfram Research, 217/398-0700.

—CHARLES SEITER


CRAIG BROWN'S
OVERHEAD PRESENTATION
WAS SO IMPRESSIVE
NO ONE NOTICED THE
GUACAMOLE ON HIS TIE.



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Circle 47 on reader service card

2 NEW PowerBooks

The 180c finally delivers active matrix color; the 145B is the new price leader

BY CARY LU

THE LONG WAIT IS OVER. APPLE HAS delivered a crisp, brilliant, color image in its latest offering, the PowerBook 180c. It's the first PowerBook to show a standard 640-by-480-pixel image—no more cutting off the bottom 80 pixels. And the 180c costs only $270 more than its gray-scale cousin, the PowerBook 180, and about $1000 more than its other cousin, the passive matrix color PowerBook 165c. If you absolutely must have brilliant colors in a Macintosh, go out and get a 180c. You can skip the rest of this article.

If you're still reading, here's the disappointing news: the 180c is not the ultimate Mac laptop. Apple's first color PowerBook, the passive matrix 165c, was a predictable disappointment—its mottled images met nobody's dreams. Everyone—myself included—said "just wait for the active matrix PowerBook." But the eagerly awaited 180c is not the PowerBook of our dreams either.

With performance and features nearly identical to those of the 165c and 180, the 180c's great advantages and serious limitations revolve around its display. For all its beauty, that display is small, it's unreadable in daylight, and it draws so much power that the batteries only last an hour. These limitations render the 180c impractical as a general-purpose portable computer.

The Display

CONSIDER SCREEN SIZE, A CRITICAL factor in that conclusion. The 180c's screen is just a bit larger than the image area of a Mac Classic or SE, even though the 180c's screen shows 75 percent more pixels. The result is a 94-dpi screen, considerably finer

PHOTOGRAPHS BY PAUL FRANZ-MOORE / SCREEN IMAGES FROM "HELL CAB" A CD-ROM ADVENTURE GAME PUBLISHED BY WARNER NEW MEDIA

Macintosh
PowerBook 145B
Macintosh
PowerBook 180c

than any screen Apple has sold before and better than the traditional Mac standard of 72 to 75 dpi.

But Apple uses the smallest 640-by-480-pixel active matrix panel used in laptops, an 8.4-inch size (diagonal). Apple declines to name its supplier, but the only 8.4-inch panels available come from Sharp Electronics in Tenri, Japan. Most laptop makers use the 8.4-inch panels because of size, lower cost, and relative availability. The larger panels—9.4- and 10.4-inch diagonals—are mainly used in laptops made by the companies that make those panels.

The 180c reduces images by 25 percent compared with standard Mac displays. And although many applications permit you to change the font size for text you input, much of what appears on screen has a fixed size. The "9-point" text in balloon help, for example, actually appears as 7-point text on a 180c. The screen is very sharp—each pixel is perfectly formed even under a magnifying glass, unlike the fuzzy pixels of a CRT display, so legibility is no problem if you can focus on the smaller-size type at a comfortable distance. (If you can read classified ads in the newspaper—they're usually in 6- to 7-point type—without difficulty, you shouldn't have trouble with the 180c's image size.) But test the screen carefully before buying. Some users might need to consider using reading glasses or adjusting their eyeglass prescription.

If you regularly work outdoors, a monochrome LCD screen is far more practical

The 180c's screen suffers from another critical disadvantage—it's a power hog. Dual backlights (found in all color LCDs)—along with nearly a million transistors deposited on the LCD panel itself—need so much power that the 180c runs about 15 to 30 minutes less per battery than the PowerBook 165c with its simpler LCD, and less than half as long as the 180, which has a single backlight and less than one-third as many screen transistors.

And like all computers with a color display, the 180c is useless outdoors except in deep shade. With monochrome LCD screens, light bouncing off the panel's reflective interior makes images visible outdoors. But with a color screen, not enough light penetrates to the reflective material, due to the panel's color filters. Those filters—three per pixel—create colors by blocking different wavelengths of light emitted by the PowerBook's dual backlights. The blue filters, for example, must block all the green and red light. This prevents most incoming light from reflecting back. Therefore, if you regularly work outdoors or even next to a large window, a monochrome LCD is far more practical.

The 180c's palette of 256 colors (8-bit color) is typical in today's marketplace. Few laptops support more colors, because current designs do not leave enough space for adequate video RAM. More colors would improve the image, but LCDs can effectively show only a few thousand colors anyway, because of their limited tonal range—one area where a CRT remains superior.

The 640 by 480 pixels in the 180c, the industry-standard pixel count used by Macs and DOS or Windows machines, is a welcome improvement over the 640 by 400 used in earlier PowerBooks. Why did Apple stick with 640 by 400 for so long? That was a standard size for Japanese computers, so the panels were readily available. And 640 times 400 is 256,000, a number accommodated by one standard memory-chip—an important factor in past years when chips cost more.

Screen Flaws

AN ACTIVE MATRIX SCREEN RAISES THE specter that has haunted some PowerBook 170 and 180 owners—stuck pixels. Industry observers estimate that about half of all color active matrix screens are

A New PowerBook 145

The PowerBook 145B differs from the now discontinued 145 mostly in price—the 145B sells for about 25 percent less. List price for a 4/40 configuration is $1649; for a 4/80, $1899. The lower prices make the 145B a more convincing entry-level PowerBook; the old prices for the 145 weren't much lower than the much more capable 160, which offers an external video connector and expansion up to 14MB of RAM.

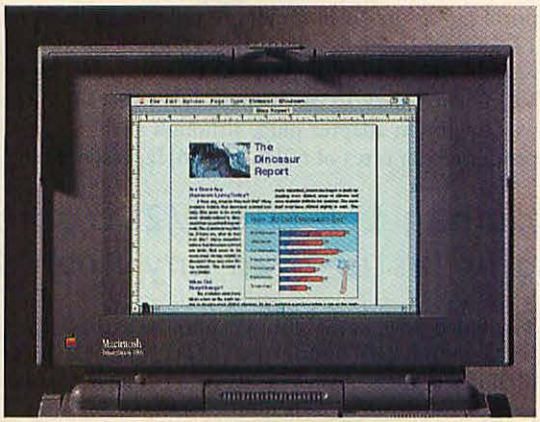
Aside from the price, the PowerBook 145B is essentially the same as the 145, incorporating a 25MHz 68030 CPU without a math coprocessor.

The PowerBook 145B: competition drives Apple to produce a lower-priced laptop.

Apple will ship the 145B with 4MB of RAM soldered to the piggyback board. Apple also shipped 4MB in the 145, but with 2MB soldered on and another 2MB on a RAM board, a RAM board that you have to remove to add more RAM. The 145B takes the same memory boards as the earlier models. You can install a 6MB board, but the computer ignores the last 2MB, recognizing only the maximum 8MB.

Apple was able to squeeze another 2MB on the piggyback board by taking over the open space left for a math coprocessor in the PowerBook 140 and 145. As a result, there is no straightforward way to add a math coprocessor. (If you have a 140, 145, or 160 and want to add a coprocessor, contact Digital Eclipse at 510/547-6101 or 800/289-3374 for a $339 upgrade.) If you know how to solder surface-mount components, you can do it yourself for the cost of the chip, about $60. But beware: it's not easy and it voids the warranty.

Apple hasn't made any other changes internally. As its PowerBook production increases, Apple is passing on its savings in manufacturing costs and meeting the competition from Windows laptops. Apple saves a little money by fiddling with the packaging of the 145B. Like the Performas, the 145B will not come with a set of system floppy disks, although a bootable floppy disk with backup software comes in the box. Also, Apple will not include a microphone, which now becomes an optional $19 accessory. This probably isn't much of an inconvenience; no one I know ever uses the microphone anyway.



Active Matrix Advantages Apple's active matrix 180c (right) is far sharper than the passive matrix 165c. The 180c screen, with 51,200 more pixels than the 165c screen has, also offers a fuller view of the image, although image size is reduced slightly.

thrown away during manufacturing. Those that pass are rarely perfect.

Fortunately, the stuck-pixel problem should be less serious for the 180c than for the 170 and 180. On a monochrome screen, a pixel can be stuck bright (a *pixel void*) or stuck dark. For a color active matrix screen, what gets stuck is not an entire pixel but a subpixel, one of the red, green, or blue components that make up a pixel. A color screen's stuck subpixel is much less visible than a stuck pixel in a monochrome screen, since two of the colors still work. (In rare cases, two or three subpixels of the same pixel may be stuck, with more obvious consequences.)

Usually, the stuck subpixels resemble photographic grain; they're often not readily visible. The visibility of a stuck subpixel depends on the desktop pattern. To find stuck subpixels you have to fill the screen with red, green, blue, and black in turn (see the diagram, "Test Your Display for Flaws").

To evaluate its panels, Sharp assigns a weighted value depending on the kind of flaw. A subpixel stuck bright is worse than one stuck dark; a green subpixel stuck bright is worse than red, and red stuck bright is worse than blue. This ranking follows the eye's sensitivity to each color. I looked at two dozen panels on several different computer models. The panels typically had three to six flaws, mostly subpixels stuck dark.

As I'm writing this, Apple has not published a guideline for what level of flaws would merit screen replacement. (For the 170 and 180, Apple will replace a screen with more than five pixels stuck bright or two stuck bright within an inch of each other; Apple will also replace any screen with a single stuck black pixel, which looks like a spurious period or decimal point.)

No computer maker guarantees perfect panels; they claim that the cost would be prohibitive for a consumer product, at least today. In the future, panel manufacturers may deposit two transistors on each subpixel and cut out any defective ones with a laser; such techniques might make perfect panels common.

Little Else New

THE REST OF THE 180c FOLLOWS THE ESTABLISHED path of the 180 and 165c. A built-in video port sup-

MW LAB Laptop Speed Check

Times are in seconds. Shorter bars are better.

Red indicates fastest result in test.

Processor Tasks

We ran tests that show how the different processors perform. Our tests included recalculating a spreadsheet, finding and replacing a word, and sorting a database (in RAM).

Drive-Access Tasks

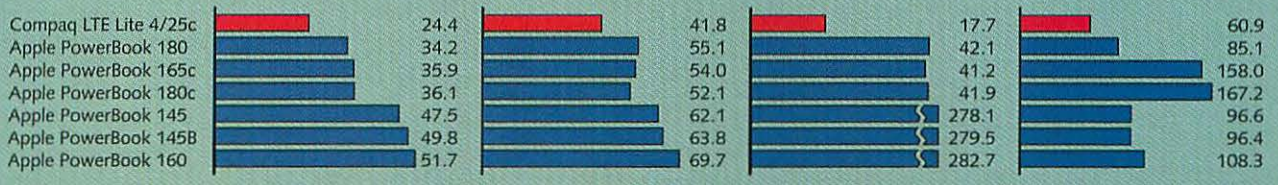
We ran tests that show how well each computer performs tasks that rely heavily on the hard drive. Our tests included opening files and sorting a database (on disk).

Math Tasks

We ran tests that depend heavily on a math coprocessor to achieve reasonable performance, including recalculations involving scientific functions.

Display Tasks

We ran tests that show how well each computer performs tasks that depend heavily on screen redraw. These included scrolling tests in Microsoft Word and Excel.



The machines are listed from overall fastest to overall slowest, top to bottom. The Compaq LTE Lite 4/25c, running on an Intel 486 processor, beats the PowerBook 180c and all other PowerBooks by a wide margin. All computers were tested with 4MB of RAM; color laptops were tested in 256-color mode. The Compaq machine used a 120MB hard drive (which partly accounts for its superior performance on drive-access tasks), the 145B used a 40MB hard drive; all others used an 80MB hard drive.

ports 256 colors on all standard Apple monitors from 12-inch to 16-inch, along with 16 grays on a one-page portrait monitor. And the 180c supports most VGA and Super VGA displays from the IBM PC world with an adapter plug, although at the flicker-prone refresh rates of 60Hz and 56Hz, respectively.

The Compaq LTE Lite 4/25c performs substantially faster than any PowerBook

The video port's capabilities cannot be expanded.

A 68030 CPU runs at 33MHz, and the 180c includes a math coprocessor. All standard ports—printer and modem serial ports, ADB, SCSI, sound-in (mono) and -out (stereo)—appear in the same back-panel configuration as on the earlier PowerBooks. A microphone is built into the molding around the screen hinge, and an internal slot accepts standard PowerBook modems. There are 4MB of 85-nanosecond RAM soldered in; RAM expansion boards can add up to 10MB more, for a total of 14MB. Be sure to add only 85ns RAM, which permits full-speed operation; 100ns RAM slows computing by about 10 percent.

Macworld Lab's tests show that the 180c, 180, and 165c all perform at the same level, with the 180c trailing only in scrolling speed because of the additional computation needed to support 256 colors (as opposed to 16 grays for the 180) and the extra 80 rows of pixels (see the bar chart, "Laptop Speed Check").

Power and Battery Life

APPLE DID NOT INCREASE THE SIZE AND WEIGHT of the batteries, choosing instead to use the same batteries and AC power adapters as with other PowerBooks (models 140 through 180), favoring easy interchangeability of components, and compact size and weight over battery life.

An hour of operation isn't much; it requires constant awareness of battery life and where the next source of AC power resides. To work continuously on a flight from Los Angeles to New York, you'll need to carry four spare batteries—boosting the 180c load to about 11 pounds. During that flight, plan carefully; battery changes require shutting down the computer, not simply putting it to sleep. This erases the RAM disk—a virtual hard drive, created in RAM, which greatly conserves power compared with normal hard drive use—and forces a complete restart. With a 180c, expect to do this often.

You can change batteries while the 180c is in sleep mode with PowerSwap ($39.95; from Utilitron, 214/727-2329, 800/428-8766), which delivers short-term power from a standard alkaline 9-volt battery.

Stiff Competition

A 180c COSTS ONLY ABOUT $270 MORE THAN A 180 with an active matrix gray-scale screen. This may seem a small premium to pay for color—but the 180 runs twice as long on batteries, and its 78-dpi screen is certainly easier on the eyes. If you don't absolutely need color, go for the 180, a computer that doesn't demand the compromises of the 180c.

You could also consider a Windows laptop with an active matrix screen running Microsoft Windows. A wide range of Windows laptops are available. (See "PowerBooks vs. Windows Laptops" for how representative Windows laptops compare with the PowerBook 180c.)

Windows is hardly equivalent to the Macintosh Operating System, but in addition to having lower prices and three-year warranties in many cases (compared with Apple's one year), some Windows laptops offer larger screens and faster performance.

The IBM ThinkPad 720C comes with an out-

POWERBOOKS VS. WINDOWS LAPTOPS

	Macintosh Machines					
	Apple Computer	Apple Computer	Apple Computer	Apple Computer	Apple Computer	Apple Computer
Phone	408/996-1010	408/996-1010	408/996-1010	408/996-1010	408/996-1010	408/996-1010
Toll-free phone	none	none	none	none	none	none
Model	PowerBook 145	PowerBook 145B	PowerBook 160	PowerBook 165c	PowerBook 180	PowerBook 180c
Screen type	passive B&W	passive B&W	passive gray	passive color	active gray	active color
Pixel count	640 × 400	640 × 400	640 × 400	640 × 400	640 × 400	640 × 480
Screen size (diagonal in inches)	9.8	9.8	9.8	8.8	9.8	8.4
Dots per inch	77	77	77	86	77	94
Number of colors or grays	2	2	16	256	16	256
Processor/speed (in MHz)	68030/25	68030/25	68030/25	68030/33	68030/33	68030/33
Math coprocessor	no	no	no	yes	yes	yes
Weight (in pounds)	6.8	6.8	6.8	7.0	6.8	7.1
Volume (in cubic inches)	235	235	235	240	235	242
Price 4/40	$2149	$1649	$2429			
Price 4/80	$2499	$1899	$2789	$3399	$4109	$4379
Price 4/120			$3149	$3739	$4469	
Price 4/160						$4739

standing 10.4-inch LCD display that puts the 180c's 8.4-inch screen to shame. Other Windows laptops use 9.4-inch screens.

Anecdotal accounts suggest that Windows laptops generally offer significantly longer battery life than a PowerBook 180c for two reasons. The Windows laptops we profile use nickel–metal-hydride batteries, which offer about 25 percent more power per pound than the nickel-cadmium batteries used in the 180c. And laptops based on Intel or Intel-compatible CPUs come in more versions than ones based on Motorola CPUs.

Windows laptop makers can use CPUs with aggressive power-saving features; these CPUs can run on 3.3 volts instead of the 5V used by the PowerBook 180c. Power consumption goes up with the square of the voltage, so a 3.3V circuit needs less than half the power of a 5V circuit. For any color laptop, the main logic board draws less power than the display or the hard drive, but Apple will be at a disadvantage until 3.3V Motorola CPUs become available sometime next year.

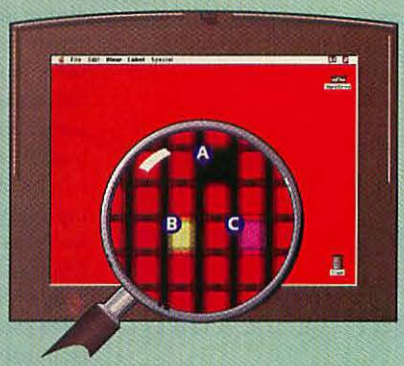
To gauge speed differences, Macworld Lab measured the performance of a Compaq LTE Lite 4/25c, a Windows laptop with the same screen as the 180c. With its Intel 486SL Processor, the Compaq performs substantially faster than any PowerBook on both drive-access and processor-dependent tasks; the LTE Lite can also scroll a Microsoft Word document more than twice as fast as can the PowerBook 180c. Apple clearly needs to catch up.

Test Your Display for Flaws

Any LCD display can suffer from screen flaws—pixels stuck bright or dark—that reduce image quality. The problem is less serious for a color active matrix screen because what becomes stuck are *subpixels*—the red, green, or blue components that make up a pixel. One stuck subpixel is less visible than a stuck pixel would be in a monochrome screen.

To find flawed subpixels, fill the screen with red, green, blue, and black in turn. Then use a magnifying glass to view each pixel. In the red screen shown, we display three typical flaws: A red subpixel stuck dark, yielding a black pixel **(A)**; a green subpixel stuck bright, yielding a yellow pixel **(B)**; and a blue subpixel stuck bright, yielding a magenta pixel **(C)**.

Bear in mind that a subpixel stuck bright is worse than one stuck dark and that a small cluster of flaws is far more noticeable than flaws distributed across the screen. An average screen will have three to six flaws. No manufacturer promises perfect LCDs, but this ten-minute test can save you from buying a substandard screen.



Windows Machines

Compaq	Toshiba	IBM
713/370-0670	714/583-3000	0
800/345-1518	800/457-7777	none
LTE Lite 4/25c	T4500C	ThinkPad 720C
active color	active color	active color
640 × 480	640 × 480	640 × 480
8.4	9.4	10.4
94	84	76
256	256	256
486SL/25	486SX/20	486SLC/25
yes	yes	yes
6.5	8.0	7.6
187	224	214
$4099		$4350
	$3999	

But bear in mind that a Windows laptop requires Windows software, sharply increasing the total cost for users who already own Macintosh software; and many Mac programs do not have Windows equivalents. Likewise, Windows machines lack amenities that a PowerBook user takes for granted, such as built-in networking, sound, and a more ergonomic design. The clip-on trackballs necessary for most Windows laptops are hopelessly awkward; the built-in trackballs in a few Windows machines are minuscule and poorly placed compared with a PowerBook's.

Sharp Screen, Faint Praise

APPLE HAS PRODUCED AN EFFECTIVE COLOR POWER Book in the 180c, given the constraint of its existing logic board and other components. A complete redesign makes little sense until a new set of Motorola chips arrives next year with higher performance and lower power consumption. Then, with a new chassis and battery pack, Apple should be able to extend battery life past two hours for color PowerBooks and past four hours for monochrome. And larger color LCDs should be more readily available.

Yet color will remain a challenge. A color screen could consume less power if highly efficient color light sources were available, such as replacing the white backlight with an array of tiny red, green, and blue light-emitting diodes—though such solutions may be years from the reality of a consumer product.

For now, if you want color and already have a monochrome PowerBook, you may want to hold off for another year, until Apple does a thorough redesign. If you feel you've waited long enough already, check out the PowerBook 180c. You'll probably love the screen, and after all, that's what the 180c is all about. **m**

Contributing editor and *PowerBook Notes* columnist CARY LU is author of *The Apple Macintosh Book* (Microsoft Press, 1992).

Macworld Lab testing supervised by MARK HURLOW and DANNY LEE.

Depth-Defying Design

A guide to 22 programs for creating realistic 3-D images

BY CARLOS DOMINGO MARTINEZ

THROUGH THE AGES, ARTISTS HAVE tried to depict three-dimensional reality within the two-dimensional constraints of cave wall, parchment, or canvas. But as this evaluation of 22 three-dimensional design programs shows, artists can now construct, illuminate, texture, and animate two-dimensional objects to produce realistic 3-D images—something their predecessors couldn't have imagined.

In the past year, new products offering high-end modeling capabilities, such as Alias Sketch from Alias Research, Macromedia's MacroModel, System Soft's Shade II, Turbo 3D from View by View/Soft'X, and Will Vinton's Playmation from Anjon & Associates, entered the fray. And established products were refined while prices generally declined.

Many 3-D packages are getting easier to use. But if you are new to 3-D, don't expect to start building space stations right off. All of these programs demand time and effort to master. And remember that hardware requirements can be steep. Every 3-D design program will benefit from the fastest Mac you can afford, and most require a math coprocessor.

How 3-D Works

MOST 3-D PACKAGES COMBINE MODELing, rendering, and animation. Modeling creates 3-D objects and scenes. Rendering adds lighting, textures, and material surfaces to produce realistic images. Animation moves the viewer through the scene or imparts motion to objects and lights.

Some 3-D packages are integrated programs that differ primarily in the emphasis given to the three components. Others specialize in one or two of the three key elements, relying on links to complementary programs for missing ingredients. Architectural programs form a distinct category. Many of the products reviewed here hold their own as architectural modelers, but for a complete architectural-design environment consider BearFox Technologies' Architrion II 5.7 ($3950; 415/558-9615) and Graphisoft's ArchiCAD 4.12 ($4450; 415/737-8665, 800/344-3468). Both are founded on 3-D modeling but cross the boundary to CAD.

Visualizing Ideas

MOST 3-D MODELERS CAN CREATE object primitives, such as cubes, spheres, and cones, and most can import font outlines and files from illustration programs for extrusion or lathing into 3-D objects. But these basic capabilities may be inadequate for complex designs. In such cases, look for *vertex editing*, *lofting*, *spline modeling*, and *Boolean operations*. (Only Form Z from autodessys, Turbo 3D from View by View/Soft'X, and ASYM Technologies/Abvent SA's Zoom offer all four of those tools.)

With vertex editing you can individually manipulate every point defining an object's geometry or its surface mesh. Lofting applies a skin over a series of modeled elements, such as wall panels over a building's framing. Boolean operations calculate the interaction of the volumes or dimensions of objects. For example, you could use a sphere to shape a cavity on a cube—like the dimples in a golf ball—by subtracting from the cube the volume of the intersecting areas.

Spline-based modelers use genuine curves to form objects with smooth-flowing lines. They offer greater precision than polygon-based programs that approximate curves with straight-line segments. NURBS (nonuniform rational B-splines)—useful for such complex shapes as auto bodies—are the most precise but also the most computationally

JIM LUDTKE

intensive splines. Sketch and Form Z are the only Mac modelers that offer NURBS.

Visualizing Images

NEARLY ALL MODELERS OFFER QUICK-rendering modes to put flesh on the bare bones of a model. Shading for finished products comes in progressively higher-quality but slower techniques.

- *Gouraud shading* gives a smooth surface with clear definition and reproduction of a scene's lighting.
- *Phong shading* provides better quality than Gouraud and, depending on the program, may add shadows, textures, reflections, and transparency.
- *Ray tracing* offers the highest rendering quality and an almost unlimited range of visual effects, but has an insatiable appetite for processor power. Ray tracing calculates values for every pixel based on the interaction of every ray of light in a scene, whether from a light source or a reflection, taking into account an object's surface properties. Complex scenes with numerous textured objects and multiple lights can take days to ray trace, even on the fastest Macs. If you regularly produce photo-realistic images, consider distributed processing and coprocessing (see *Lab Notes*, *Macworld*, June 1993).

If your renderings are to be transferred to videotape or combined with photos using image processors such as Adobe Photoshop, alpha-channel support is important. The alpha channel of 32-bit QuickDraw lets you produce masks that allow seamless superimposition—*compositing*—of images. Compositing individually rendered objects with a background image also reduces rendering times.

Visualizing Motion

SOME DESIGN PROGRAMS INCLUDE BASIC *keyframe animation* (also called *tweening*), which defines specific points (*frames*) along the path of intended motion. The computer calculates how the object moves across intervening frames.

Some programs offer only basic tools for flying through the scene or moving and rotating objects. Good animators, such as Anjon & Associates' Playmation, Specular International's Infini-D, Strata's StrataVision 3D, VIDI's Presenter Pro, and System Soft's Shade II offer control over every element in a scene over time, including lights and viewpoints. A few products, such as Playmation and Infini-D, even let you alter textures and transform—*morph*—one object into another.

Top-level animators, such as Macromedia's Macromedia Three-D, Electric Image's ElectricImage Animation System, and Crystal Graphics' Crystal TOPAS for the Mac, offer total control over imaging, and broadcast-quality output.

Transferring Files

INCREASINGLY, 3-D PACKAGES OFFER DIrect import/export of native-format files from other programs. If that's not available, look for RIB (RenderMan Interface Bytestream) and DXF (Drawing Exchange Format) support; both are de facto interapplication and cross-platform standards. DXF is the most common format for transferring 3-D models. But depending on how objects are handled by the sending, receiving, and translating programs, files can be distorted—sometimes substantially—or lost during transfer.

Some 3-D modeling systems use other formats. Transferring these files may require an independent translator, such as Kandu's CADmover ($495; 703/532-0213), an interpreter fluent in over a dozen formats.

Use 3-D design products for a while and pretty soon the cravings start—more textures, clip-art objects, and maybe utilities to enhance scenes or make modeling more convenient. Specular International, Macromedia, and Strata sell collections of clip objects for use with their respective programs. Strata also offers texture collections. And a variety of other companies sell custom kits or collections of canned images and textures—including animated textures (see *Reviews*, in this issue).

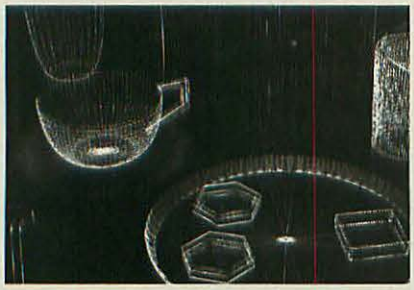
The capsule reviews that follow are arranged by list price in ascending order. But be aware that price doesn't always reflect capability.

Ray Dream Designer 2.0.6 ($299) Ray Dream's Ray Dream Designer—the lowest-priced full-fledged modeling and rendering package—is hampered by operating in two separate modules. It also lacks animation. But the modeling module supports multiple 2-D Bézier cross sections and can edit primitives as Bézier paths. Models appear in a quick-rendering preview window, where a click-and-drag rotates them.

The rendering module only offers ray tracing, but it's a relatively quick, high-quality version that uses *procedural textures*—mathematical descriptions of materials that, like wood grain, become an integral part of the object—rather than a surface effect.

Ray Dream Designer is an excellent choice for graphic artists working with print media. Affordability puts this product atop the price-performance list.

Multistage Rendering



Wire Frame Sandy Chase modeled and rendered this image in StrataVision 3D. For each polygonal object Chase used StrataVision's triangulated polygonal mesh. This eases surface smoothing, as shown in the coffee cup—it appears circular despite being composed of many tiny triangles. The object in the lower left of the image was drawn in Adobe Illustrator, imported into StrataVision, then extruded into three dimensions.

Phong Rendering After an initial rendering using the Gouraud method, Chase added color with Phong rendering. Each object was given a single color, without reflections from other objects. Phong provides a preview of the final, ray-traced image, complete with textures. The wooden cutting board, for instance, is given an algorithmically produced texture that shows a grain going through the entire object. This stage took about 90 minutes to render.

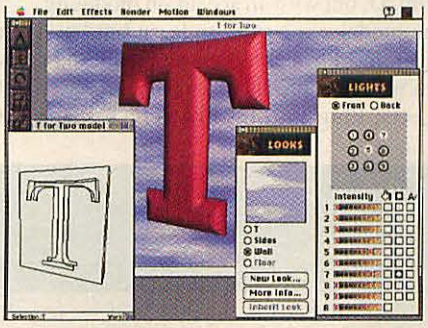
Reflective Surfaces To complete the image, Chase ray-traced every surface using multiple, customized textures. The surface of the glass is mapped to mask the green design, then mapped again with the design. He added a refraction field to distort the white candy visible through the glass. Notice, also, the subtle reflection effects on the surface of the glass. Rendering the complex image took two and a half days on a Quadra 950 with 90MB of RAM allocated to the task.

Easing the 2-D–to–3-D Transition

Daunted by the complexity of full-blown 3-D packages? Strata's StrataType 3d ($295) and Pixar's Typestry ($299) are 3-D typographers. Both can extrude objects from TrueType or PostScript Type 1 font outlines. StrataType provides various preset text arrangements (such as curved or bowed) and lets you kern individual letters and customize bevels. Typestry applies only preset bevels but lets you manipulate individual letters and includes basic keyframe animation.

Typestry offers 18 light sources, comes with a decent assortment of textures, and can use MacRenderMan Shaders. StrataType 3d offers unlimited light sources, color light gels, and a built-in utility to convert PICT images into textures. Both are good renderers, with the edge to Typestry.

Adobe Systems' Dimensions ($198; 415/961-4400) and Ray Dream's addDepth ($179) build 3-D objects from outlines produced with Aldus FreeHand, Adobe Illustrator, or Deneba's Canvas. addDepth only extrudes, but includes tools for Bézier drawing and supports TrueType and Type 1 fonts. Adobe Dimensions both extrudes and lathes outlines, giving it greater modeling versatility, but most objects, including text, must begin life in the 2-D program.



Typestry's easy controls let you apply a range of surfaces, add lighting, and render text objects extruded from font outlines.

Both addDepth and Dimensions can produce primitives, offer good beveling tools, and export their 3-D objects back to the 2-D programs as editable Béziers. Dimensions also has a limited animation capability.

Either program can map a 2-D drawing onto an object, but Dimensions' ability to apply drawings onto lathed surfaces gives it an advantage for product illustration. Both programs are limited to smooth surfaces and white lights, and neither program is in the same rendering class as full-fledged 3-D packages, or for that matter, StrataType or Typestry. addDepth and Dimensions' advantages lie in the production of 3-D art with the editing ease of PostScript.

Upfront 1.02a ($425) An architecturally oriented modeler, Alias Research's Upfront lets you draw with shaded objects in 3-D perspective, providing quick feedback as you design. Rendering capabilities are limited, but Upfront incorporates a good daylighting feature, and lets you align the model and its shadows with the perspective of a background image. Upfront is a capable modeler but its interface strays from Mac standards, making it more difficult to learn than ModelShop or DynaPerspective.

Virtus WalkThrough 1.1.3 ($495) WalkThrough, from Virtus, offers one unique feature: instantaneous, interactive access to 3-D scenes. Move the mouse and travel anywhere in the scene. WalkThrough comes with a library of architectural objects, can import and export DXF and ClarisCAD files as templates, and includes a utility for creating runtime documents. For quick, interactive, architectural massing studies, WalkThrough is unmatched.

But WalkThrough's modeling tools are limited to customizable object primitives, and its renderings are simple flat-shadings with transparency effects, so it's not for detailed prototyping.

Will Vinton's Playmation 1.48.4 ($556) Playmation, from Anjon & Associates, is a character-animation–production studio in a box. Playmation's spline-based modeler can build complex, organically shaped objects. Its animator can link objects with spline backbones to produce realistic coordinated movement and can morph an object's surface-mesh to create effects like skin over a flexing bicep. The rendering module only ray-traces, but it offers thumbnail previews and provides rendering progress reports.

Playmation is a bargain, but you pay for it with an awkward hodgepodge of an interface based on Amiga and Windows conventions. And perhaps owing to its simultaneous development on three platforms, Playmation is a little unstable.

MacRenderMan 1.1/ShowPlace 1.1.1 ($695) Pixar's MacRenderMan offers superlative rendering and many Shaders. Its big drawback is the snail-like speed expected with photo-realism.

ShowPlace—an interface to ease MacRenderMan's complexity—lets you import RIB files, arrange objects in scenes, add lighting effects, and apply Shaders to objects. But Showplace lacks object-creation tools, and while you can adjust Shader values (such as reflectivity), you can't customize Shaders. A modeler with strong links to MacRenderMan is better.

Swivel 3D Professional 2.0.4 ($695) Macromedia's Swivel 3D Professional was once the best affordable 3-D modeler. Now it's squeezed between the inexpensive Ray Dream Designer and more-accomplished modelers costing only a few hundred dollars more.

Swivel 3D Pro remains an excellent program, however, boasting competent modeling tools, a good interface, and unlike Ray Dream Designer, a workable animation component. Swivel 3D Pro's rendering is fast and smooth even at its best-quality setting. SwivelMan—Swivel 3D Pro bundled with MacRenderMan—offers photo-realistic rendering for $200 more. But at SwivelMan's price, consider programs with more-robust modeling or better built-in rendering.

ModelShop II 1.2 ($895) Macromedia's ModelShop II is a good choice for architects. It handles simple architectural massing studies with ease, and with its Bézier walls, DXF and ClarisCAD file support, well-endowed parts library, and geographically accurate daylighting, ModelShop II can handle detailed models. It also provides a handy utility for building stand-alone run-time animations.

ModelShop II provides generic modeling tools, but for nonarchitectural design, Swivel 3D Pro or Ray Dream Designer are better and less costly. ModelShop's rendering offers no textural frills, nor can it animate objects.

Alias Sketch 1.5 ($995) Alias Research's Sketch is the lowest-priced program with top-quality modeling features. Once mastered, Sketch's NURBS-based spline modeler excels at producing smooth, organically shaped objects. Its putty tool maintains intervertex relationships, so that tugging on one vertex deflects the vertices connecting to it. Sketch can align modeled objects with the perspective of a scanned background image—wonderful for placing models within a realistic environment.

Sketch lacks animation but offers high-quality, built-in rendering. Recent additions include MacRenderMan support, and tools to import outline text from FreeHand and Illustrator. At $995, it's the price-for-performance leader among high-end modelers.

DynaPerspective 2.33 ($995) In addition to basic modeling tools, Dynaware USA's DynaPerspective provides such architectural-design niceties as wall, post,

and stair tools, and drafting layers for floor plans. Built-in rendering offers transparency effects and a single light source. The program also supports MacRenderMan. A good producer of animated tours, DynaPerspective excels at hard drive–based presentations; these are not as seamless as videotapes, but are a convenient alternative.

Infini-D 2.5 ($995) Specular International's Infini-D produces photo-realistic ray tracings and excellent Phong renderings that can incorporate reflection and fog effects. And the product includes many procedural textures. Infini-D's animator is the easiest to master and offers such extras as the ability to animate textures, morph between objects with different numbers of vertices, and smooth out camera motion.

Infini-D's modeling tools are well implemented but inadequate for complex shapes and constructions. However, it now extrudes and bevels Type 1 and TrueType fonts, and System 7 links provide instant updates in Infini-D of outlines edited in FreeHand or Illustrator. For graphic artists and animators, Infini-D offers a great balance of features.

StrataVision 3D 2.6 ($995) Strata's StrataVision 3D is as well balanced as Infini-D, but with an accent on modeling. The modeler is harder to learn but has a larger, more-capable tool set, including a skin tool that produces flexible animated objects. Plug-in tools like 2-D–reshape

Texture Variations David Poole modeled this image in VIDI's now-defunct product Dimensions. The file was then exported to MacRenderMan for texturing and rendering. Notice the distinct textural variation—from the softness of the refrigerator surface and the dog's snout, to the sharpness of the shadows on the cabinets.

TOOLS TO FIT ANY JOB

	Alias Sketch 1.5	Crystal TOPAS for the Mac 1.2[A]	DynaPerspective 2.33	Animation System 1.5	Form Z 2.1.5	Infini-D 2.5
Company	Alias Research	Crystal Graphics	Dynaware USA	Electric Image	autodessys	Specular International
Consumer contact number: toll	416/362-9181	408/496-6175	415/349-5700	818/577-1627	614/488-9777	413/549-7600
Consumer contact number: toll-free	800/447-2542	800/394-0700	○	○	○	800/433-7732
List price	$995	$2995	$995	$7495	$1495	$995
Copy protection	○	ADB key	○	ADB key	ADB key	○
MODELING						
3-D primitives	●	●	●	○	●	●
Extrusion	●	●	●	○	●	●
Lathing	●	●	●	○	●	●
3-D vertex editing	●	●	○	○	●	○
Lofting	○	●	●	○	●	○
Spline modeling	●	●	○	○	●	○
Boolean operations	○	○	○	○	●	○
Font extrusion	○	proprietary fonts, Type 1	○	Type 1	○	TrueType, Type 1
RENDERING						
Phong shading	●	●	○	●	●	●
Ray tracing	●	○	○	○	○	●
Number of light sources	unlimited	20	1	unlimited	1	unlimited
Shadows	●	●	○	●	●	●
Architectural daylighting	○	●	○	○	●	○
Environment map	●	●	○	●	○	●
Texture map	●	●	○	●	○	●
Procedural textures	○	○	○	○	○	●
Alpha channel	●	●	○	●	○	●
MacRenderMan support	●	●	●	○	○	○
ANIMATION						
Keyframe	○	●	flythroughs	●	○	●
Morphing	○	●	○	●	○	●
QuickTime support	○	●	●	○	○	●
IMPORT/EXPORT						
Geometry import	EPS, DXF, IGES, Upfront	DXF, IGES, TEXT	DXF	many major formats	PICT, DXF	EPS, DXF, Swivel 3D
Bitmap import	PICT, TIFF, Alias PIX	PICT, TIFF, TGA, GIF	○	many major formats	PICT	PICT
Geometry export	EPS, DXF, RIB, IGES	DXF, RIB, IGES, TEXT	DXF, RIB	DXF, 3DGF, Sculpt 3D, Super 3D, Zoom, and 12 others	PICT, DXF	DXF
Bitmap export	PICT, TIFF, Alias PIX	PICT, TIFF, TGA	PICT, PICS	PICT, TGA	PICT	PICT, PICS, TIFF

● = yes; ○ = no. [A] *Also sold separately: Desktop Animator ($1995) and Crystal 3D Designer ($995), the animation and modeling components, respectively, of Crystal TOPAS.* [B] *Sculpt 4D, effects only.* [F] *With Sculpt 4D only.*

and extrude—give StrataVision an almost unlimited upgrade potential.

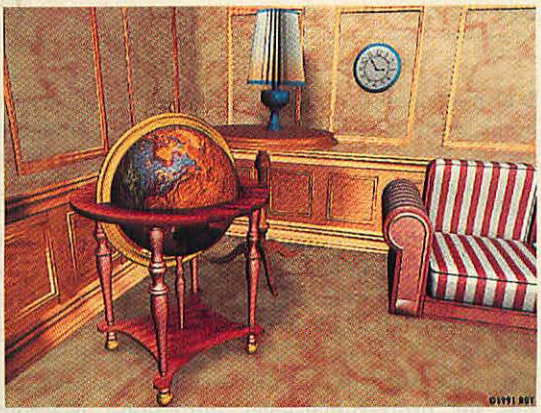
In addition to Gouraud and Phong shadings, StrataVision produces high-quality ray tracings and offers Raydiosity, a superb renderer for matte surfaces, albeit an incredibly slow one. StrataVision is the only program this side of Electric Image's $7495 ElectricImage Animation System that can separately texture each bevel on a single object.

StrataVision can animate textures and morph objects, but its animation controls can be hard to master. Still, designers looking for an all-in-one product will find StrataVision an excellent choice.

Form Z 2.1.5 ($1495) Form Z, from autodessys, is a solids modeler that defines objects by their volume, making it particularly adept at Boolean operations. Form Z also builds NURBS-based surface objects. You can apply them over solids, transform them into solids, and shape them like modeling clay. Conceived for architecture, Form Z also includes a built-in 2-D drafting component.

Form Z's rendering abilities work well—within their limits. You can only apply a color—not a texture—and you must cast shadows from the single light—the Sun. But if you can imagine it, Form Z can model it.

MacromediaThree-D1.2 ($1495) Macromedia Three-D offers the best animation interface, providing control over every element in a scene over time. Anyone familiar with Director, the excellent



Bump Mapping Roy Santiago modeled this image in Swivel 3D Pro and rendered it in Macromedia Three-D. He created the 3-D texture on the globe's surface by first wrapping a flat image around the globe, then assigning colors along a gray scale. Santiago gave each shade of gray a different degree of relief, or bump, adding color to create the elevation effect. This image took 16 minutes to render.

MacRenderMan 1.1/ ShowPlace 1.1.1	Macromedia Three-D 1.2	MacroModel 1.0	ModelShop II 1.2	Presenter Professional 1.5	Ray Dream Designer 2.0.6	Sculpt 3D 3.0[B]
Pixar	Macromedia	Macromedia	Macromedia	VIDI	Ray Dream	Byte by Byte
510/236-4000	415/442-0200	415/442-0200	415/442-0200	818/918-8834	415/960-0765	512/795-0150
800/888-9856	800/288-4797	800/288-4797	800/288-4797	○	800/846-0111	○
$695	$1495	$1495	$895	$2995	$299	$2500
○	○	○	in network version only	ADB key	○	ADB key
○	○	●	●	●	built from 2-D objects	●
○	○	●	●	●	●	●
○	○	●	●	●	●	●
○	○	●	●	●	○	●
○	○	●	○	●	●	●
○	○	●	2-D Bézier wall objects	●	2-D Bézier objects	●
○	○	○	○	○	○	○
●	TrueType	TrueType, Type 1	○	Type 1, Type 3	TrueType, Type 1	Type 1
○	●	●	●	●	○[C]	●
proprietary algorithm	○	○	○	●	●	●
unlimited	unlimited	16	unlimited	unlimited	unlimited	unlimited
●	●	●	●	●	●	●
○	○	○	●	○	○	○
●	●	○	○	●	●	●
●	●	●[D]	○	●	●	●
●	○	○[D]	○	●[E]	●	●
●	●	●	○	●	●	●
○	●	●	○	●	○	○
○	●	○	flythroughs	●	○	●[F]
○	●	○	○	○	○	●[F]
○	○	○	○	●	○	○
RIB	3DGF, Swivel 3D, MacroModel, DXF, IGES, Super 3D, Sculpt 3D	PICT, DXF, ClarisCAD, Swivel 3D	PICT, DXF, ClarisCAD	PICT, DXF, EPS, IGES, ElectricImage, Super 3D, VersaCAD	EPS, DXF, Swivel 3D, 3DGF	EPS, DXF, IGES,STL
PICT, TIFF	PICT, PICS	PICT	PICT	PICT	PICT	PICT, TIFF, PRIM
RIB	3DGF	PICT, DXF, RIB, 3DGF, ClarisCAD, Swivel 3D	PICT, DXF, Swivel 3D, ClarisCAD	DXF, EPS, RIB, ElectricImage, VersaCAD, WaveFront	DXF, 3DGF	EPS, DXF, IGES, STL
EPS, PICT, TIFF	PICT, PICS	PICT	PICT, PICS	PICT, TIFF	PICT	PICT, TIFF, PRIM, PICS

which adds animation, costs $3500; Sculptor, a stand-alone modeler, costs $1500. [C] *Phong available in modeling module only.* [D] *With RenderMan bundle only.* [E] *Surface-indentation*

2-D multimedia animator, will feel at home with Three-D's score-and-cast metaphor.

Three-D's best imaging mode is a high-quality Phong renderer, and Three-D can output scenes directly to MacRenderMan. Three-D bundles good utilities that composite images and provide videotape output; but its file translator is limited, and hard to install. Three-D's steep learning curve will put off casual users. But for professional-level animation tools, Three-D is a bargain, weighing in at $1500 less than its closest competitors—Crystal TOPAS for the Mac and Presenter Professional.

MacroModel 1.0 ($1495) Think of Macromedia's MacroModel as Swivel 3D's smarter brother. A spline-based modeler with a clear, logical interface and excellent controls, MacroModel can transform any object into a free-flowing shape and gives you complete control over vertices and curves. More complex than Swivel, MacroModel is well worth the extra effort it requires to learn.

MacroModel offers quick and smooth rendering, but lacks Swivel's texture- and environment-mapping effects. Like Swivel 3D, MacroModel can use Presets to apply MacRenderman Shaders. And Macromedia Three-D now accepts MacroModel files directly. Animation features similar to Swivel's are expected with the next version, but tack on the cost of high-quality rendering and MacroModel suffers in comparison with Sketch.

Zoom 3.0 ($2495) Zoom (sold by ASYM Technologies) is a fast and highly capable solids modeler and renderer. A multitude of CAD-like tools gives Zoom great versatility.

Transparency Effects John Ulliman and Josh Sarantitus modeled the museum room architecture and display cases in ArchiCAD. Then they used Sculpt 3D to create the objects in the cases. All the rendering was done in Sculpt 3D. Sculpt 3D creates realistic differences among up to 7 layers of glass in this image. The realistic lighting effects required 15 separate light sources. The power of Sculpt's modeler is also revealed in the complex, asymmetrical object in the case on the far right.

TOOLS TO FIT ANY JOB (CONTINUED)

	Shade II 1.4.2	StrataVision 3D 2.6	Swivel 3D Professional 2.04[G]	Turbo 3D 5.03	Upfront 1.02a	Virtus WalkThrough 1.1.3
Company	System Soft America	Strata	Macromedia	View by View/Soft'X	Alias Research	Virtus Corporation
Consumer contact number: toll	415/853-6400	801/628-5218	415/442-0200	415/775-6926	416/362-9181	919/467-9700
Consumer contact number: toll-free	○	800/678-7282	800/288-4797	○	800/447-2542	800/847-8871
List price	$4000	$995	$695	$3495	$425	$495
Copy protection	ADB key	○	○	ADB key	○	○
MODELING						
3-D primitives	●	●	built from 2-D objects	●	●	●
Extrusion	●	●	●	●	●	●
Lathing	●	●	●	●	●	○
3-D vertex editing	○	○	○	●	●	●
Lofting	●	●	○	●	○	●
Spline modeling	●	2-D Bézier objects	○	●	○	○
Boolean operations	○	○	○	●	○	○
Font extrusion	○	TrueType, Type 1	●	○	○	○
RENDERING						
Phong shading	●	●	●	○	○	○
Ray tracing	●	●	○	○	○	○
Number of light sources	unlimited	unlimited	8	4	1	unlimited
Shadows	●	●	●	●	●	○
Architectural daylighting	○	○	○	●	●	○
Environment map	●	●	●	○	○	○
Texture map	●	●	○[I]	○	○	○
Procedural textures	●	●	○[I]	○	○	○
Alpha channel	●	●	○	○	○	○
MacRenderMan support	●	●[K]	●	●	○	○
ANIMATION						
Keyframe	●	●	●	flythroughs	○	○
Morphing	○	●	○	○	○	○
QuickTime support	○	●	○	○	○	●
IMPORT/EXPORT						
Geometry import	DXF, DynaPerspective	PICT, EPS, DXF, IGES, MiniCAD, Super 3D, Swivel 3D, PICT	ClarisCAD, DXF, PICT (Clipboard)	PICT, TEXT, DXF[K]	PICT, DXF	PICT, DXF, ClarisCAD, MacDraw II
Bitmap import	PICT	PICT, PICS	PICT (Clipboard)	○	PICT	PICT
Geometry export	DXF	EPS, DXF	PICT, EPS, DXF, RIB	PICT, EPS, RIB, TEXT, DXF[K]	PICT, EPS, DXF	EPS, DFX, ClarisCAD, MacDraw II
Bitmap export	PICT, PICS, TIFF, RGB	EPS, PICT, TIFF	PICT, PICS	○	PICT	PICT, PICS

● = yes; ○ = no. [G] SwivelMan, which is Swivel 3D Pro bundled with MacRenderMan, costs $895. [H] From 2-D primitives only. [I] Phong available in modeling module only.

Its interface is complex, but floating palettes make it easier to use than Sculpt 3D or Turbo 3D. Zoom is a better-than-average renderer, with decent control of textures and lighting. In addition, it supports MacRenderMan and lets you edit Shaders from within the program.

Sculpt 3D 3.0 ($2500) Byte by Byte's Sculpt 3D is an extremely powerful modeler. Unfortunately, an arcane interface makes the program difficult to use. Though many fans swear by it, at first you might swear at it.

Sculpt 3D produces excellent renderings; and for another $1000, Sculpt 4D (a separate product) adds keyframe animation. It's also fast, but if you need more speed, Sculpt 3D/4D RISC ($7500/$9500) opens the door to YARC-board acceleration. The Sculpt RISC/-YARC combination rivals the processing performance of workstation products—and their price, as well.

Will Vinton's Playmation 1.48.4	Zoom 3.0
Anjon & Associates	ASYM Technologies/Abvent SA
818/566-8551	510/943-6157
800/377-8287	○
$556	$2495
○	varies with version
●[H]	●
●	●
●	●
●	●
●	●
●	2-D Bézier objects
○	●
○	○
○[I]	●
●	○
unlimited	128
●	●
○	○
●	○
●	●
●	○
○	○
○	●
●	○
●	○
●	●
○	DXF, TEXT, QuickTime
PICT, TGA, PCX	PICT
DXF	PICT, DXF, RIB, TEXT, ArchiCAD, ElectricImage
PICT	PICT, PICS

[I] *In SwivelMan only.* [K] *With extra-cost module.*

Crystal TOPAS for the Mac 1.2 ($2995) Crystal Graphics' TOPAS is an all-in-one package with lots of power. It offers advanced modeling tools, including spline-surface manipulation. A speedy, high-quality renderer produces shadows, transparency, and fog effects. And its full-featured animator offers frame-accurate, broadcast-quality output. Crystal TOPAS competes well with Presenter Pro and Sculpt 3D/4D.

Crystal Graphics sells the animator component of TOPAS, Crystal Desktop Animator, for $1995. That product lacks support for video output but is comparable to Shade II. The modeler component of TOPAS sells separately as Crystal 3D Designer and costs $995.

Presenter Professional 1.5 ($2995) Among the first 3-D packages for the Mac, VIDI's Presenter Professional is still one of the best. Its roots in CAD endow it with tools not ordinarily found in 3-D modelers, enriching its modeling options. Presenter Pro also has keyframe animation, and good-quality, built-in rendering that takes advantage of YARC-board acceleration. And Presenter Pro has the best MacRenderMan interface, letting you access and apply Shaders directly.

Turbo 3D 5.03 ($3495) Turbo 3D is an excellent modeler but one that is hard to master. The interface is not always intuitive, but Turbo 3D's range of tools is enough to do any CAD package proud. Turbo 3D's strength is detailed modeling; you wouldn't turn to it for graphic design or roughing models. It incorporates an extensive 2-D drafting component and switches easily from 2-D to 3-D.

Turbo 3D's rendering is fairly basic, but the program can export files to MacRenderMan. The animation component is difficult to use and is limited to walk-through sequences. Turbo 3D is a versatile design tool, but it's more CAD package than conceptualizer.

Shade II 1.4.2 ($4000) System Soft's Shade II is a versatile modeler that can build spline-based, compound-curved objects. This well-balanced product resembles Infini-D but with a high-end, more complex modeler. It offers extensive surface-mapping capabilities, procedural textures, and a facility for compositing models on PICT images. Rendering options include Phong shading, ray tracing, MacRenderMan output, YARC-board support, and a distributed-rendering utility. Good animation capabilities complete the package.

Overall, Shade II stacks up well against its high-end competitors. It's easier to navigate than Zoom, Turbo 3D, or Sculpt 3D. However, comparably equipped products—Crystal TOPAS and Presenter Pro—cost about $1000 less.

ElectricImage Animation System 1.5 ($7495) ElectricImage's Phong-based engine is a quick, high-quality renderer. It lacks procedural textures but excels at fine-tuning surface attributes. The animator provides total imaging control and frame-accurate, broadcast-quality output. Mr. Font, a bundled font-extrusion module, is excellent, and Transporter is the best file-transfer utility currently available with 3-D packages. For professional animators who need high-volume imaging throughput, ElectricImage is still the best choice. Sadly, only professionals can afford it.

MW EDITORS' CHOICE

Best Price for Performance

Ray Dream Designer 2.0.4 This is by far the best modeling/rendering value around. **Company:** Ray Dream. **List price:** $299.

Alias Sketch 1.5 A NURBS-based spline modeler with excellent built-in rendering, Sketch is the lowest-priced program with high-end capabilities. **Company:** Alias Research. **List price:** $995.

All-in-One Solutions

Infini-D 2.5 Affordability, general ease-of-use, excellent rendering, and good animation make Infini-D the best all-in-one solution for graphic artists. **Company:** Specular International. **List price:** $995.

StrataVision 3D 2.6.1 A well-balanced package with excellent rendering and decent animation. Superior modeling tools make it a top choice for designers who aren't wealthy. **Company:** Strata. **List price:** $995.

A Little Perspective

FINALLY, WHILE WELL-ROUNDED PROgrams like Infini-D and StrataVision 3D can do a creditable job on almost any project, you may need to combine products for the best results. For example, the combination of MacroModel for modeling, MacRenderMan for rendering, and MacroMind Three-D for animation and broadcast-quality output brings exceptional tools to each function.

People who make a living by modeling, rendering, and animating know this. Most own several products and use whichever fits the task. Like the artists who preceded them, modern 3-D designers understand the value of having the right tool for the job. **m**

CARLOS DOMINGO MARTINEZ has written about 3-D design on the Mac since 1986; he was technical and features editor of the late, lamented *Macintosh-Aided Design*.

BY
MATTHEW
LEEDS

Real-Time

Compression programs can double your storage

ANYONE WHO HAS SUDDENLY found a full hard drive where just a few months or even weeks ago there were megabytes of free space can relate to the often-repeated saying "Nature abhors a vacuum." For much less than the price of a larger hard drive, on-the-fly compression products—those that work in the background, as you open and save files or when you are not working—promise to as much as double the storage space on your existing hard drive.

The appeal is obvious, as a little bit of math shows. Say that you want to expand from 80MB. You can get a compression program for between $50 and $70 from a discount outlet, compared with about $300 for an internal 170MB drive. (If you sell or trade in your 80MB drive, the cost is less, totaling about $200.) So a compression program can save you $150 to $250. (Of course, if you add a 170MB *external* drive, which costs about $330, you get a total of 250MB—more than a compression program can squeeze out of an 80MB drive.)

With compression programs claiming doubled storage at low prices, you have to ask if they're too good to be true. Compression has long been available for DOS PCs, and the answer in that market has been mixed, with many users having no trouble and many others complaining about poor performance or unreliability (witness the problems some Microsoft DOS 6.0 owners had with DoubleSpace). Now, a host of products aimed at Mac owners raises the question anew. Some of the Macworld Lab results surprised us, and they may surprise you, too.

Choice of Technologies

WE EXAMINED TWO CLASSES OF BACKground compression products, file-level and driver-level, testing them for speed, space saved, ease of use, and reliability.

File-Level Compression A file-level compressor compresses files when your system is not in use, such as during pauses in your work. When you open a file, a file-level compressor either decompresses the data so it's in the standard format your programs expect or loads it directly into memory.

In the file-level class, we tested AutoDoubler 2.0.1 from Fifth Generation Systems, StuffIt SpaceSaver 1.0.4 from Aladdin Systems, and More Disk Space 2.1 from Alysis Software Corporation. We also tested ETC Peripherals' DataPress, a SCSI hardware-compression peripheral that uses More Disk Space as an interface. We also looked at a prerelease copy of Now Compress from Now Software, which should be shipping by the time you read this.

On-the-fly data compression is used in other products as well. Modems, backup utilities, JPEG boards, and even the system software running on your Mac, take advantage of some form of compression. PICT and QuickTime files use a form of compression, and there are many commercial and shareware applications for compressing files. What makes file-level compressors different is that they use a set of rules that you create to compress specified items on your hard drive whenever you're not actively using your Macintosh.

Driver-Level Compression A driver-level product essentially replaces the Mac's hard-drive driver, which controls how the Mac (and thus all programs) deals with files. Instead of compressing data when there's idle time and then decompressing the data as it's used, these products keep everything compressed on the hard drive and decompress data when the Mac reads it from the drive. There is no software interface to the compression product, so you don't need to set up rules to decide what gets compressed or how long the Mac needs to sit idle before compression starts.

In this class, we tested TimesTwo 1.0.1 from Golden Triangle Computers. Stac Electronics was unable to provide a working prerelease version of Stacker for Macintosh (based on the popular DOS program), which may ship by the time you read this. The same is true of Alysis Software Corporation's eDisk, which just started shipping as we went to press, despite having been advertised as long ago as February in publications like *Macworld*.

Setting Up File-Level Compressors

AUTODOUBLER AND SPACESAVER ARE system extensions that run automatically. More Disk Space is an application

PETER HOEY

that you must run manually or place in the Startup Items folder if you're running System 7.

Installation Installing AutoDoubler and SpaceSaver is straightforward, since their installers are easy to use. In contrast, the More Disk Space installer is confusing: you must register your software and select your setup options before installing the program. Plus, the installation instructions in the manual differed from a loose sheet included with the product that we received, and it took a while to figure out exactly what was expected. The manual for More Disk Space is tiny, confusing, and hard to understand. The other products' manuals are fine.

Common Features All the products take you through a process of defining the rules for what gets compressed, what is excluded from compression, when compression can occur, and some user interface options such as hot keys. Common to all are options to do the following:

- Set the idle time delay, the period of time your Mac must sit unused before compression begins. (Because of this approach, these file-level compressors are sometimes called idle-time compressors.)
- Use labels on files to mark items for inclusion or exclusion from compression.
- Use file-name prefixes or suffixes to

Compression

space—but there's a catch

mark items for inclusion or exclusion from compression.

- Use an exception list of applications not to be compressed.
- Provide a choice between faster file compression and smaller file size.
- Indicate which drive volumes and partitions will be compressed.

Based on the prerelease version we saw, Now Compress will offer several unique features, including compression at shutdown and the ability to schedule the start of idle-time compression, which is useful if you use your machine to remotely handle tasks at specific times and don't want other background events (like backup) occurring in the same period.

Missing Features Except for these common features, each program differs in its options and usage. In part this is due to companion products sold by some of the publishers. For example, in attempting to avoid overlapping functionality with existing products, Aladdin Systems and Fifth Generation Systems have left out useful (and necessary) functions, and for many users, that omission keeps these products from being transparent, single-product compression solutions.

For example, neither AutoDoubler nor SpaceSaver can segment a compressed file or folder so it can be copied to several disks if one disk won't hold it. (More Disk Space offers this option, as does the prerelease version of Now Compress.) AutoDoubler doesn't let you create self-extracting files that you can transport to other machines. It does include a utility, called CopyDoubler, that lets you copy compressed files in their compressed form (which is faster), or decompress them as you copy them to specific types of disks (aimed at users of removable media). SpaceSaver doesn't let you edit the list of programs, such as telecommunication or backup programs, that are allowed to read files in compressed form.

No virus-protection program can check compressed files for infection. This means that you should use caution if you receive compressed files from someone, regardless of what compression program they use. Several vendors of compression products are working with publishers of virus-detection products to provide a method for scanning compressed files, but for now, the only way to check a compressed file is to decompress it first.

For basic users, these and other issues may not be important. All the file-level products we looked at handle simple file-level compression fairly well, although AutoDoubler offers the most parameters for deciding what gets compressed. Of more interest may be just how fast compression and decompression occur, and how much space is saved.

The Hardware Option The hardware-based DataPress is the only SCSI compression peripheral on the market. It lets you daisy-chain up to seven drives from its SCSI port, which means you can compress data on multiple drives. Other features include so-called Super Volumes, which let you combine several drives into a single logical drive (for example, three 40MB drives would look like a single 120MB drive). ETC Peripherals says it is working on improvements that will quadruple the current compression speed and that will allow disk mirroring (which saves data twice on different drives to improve the chances of file recovery in case of a disk crash).

Setting Up Driver-Level Compressors

GOLDEN TRIANGLE'S TIMESTWO, STAC Electronics' Stacker for Macintosh, and Alysis's eDisk take an entirely different approach.

TimesTwo Of the three, only TimesTwo was shipping in time for testing. This hard-drive driver, which replaces your Mac's existing driver, can usually be installed on a disk that already contains data, but Golden Triangle suggests that you first back up your data. The company also suggests that you run a disk-checking utility like Apple's Disk First Aid to make sure that your hard drive is in good shape before you install TimesTwo.

Installation is simple but time-consuming. You first must personalize the disk TimesTwo ships on, then select the drive you want to install the driver on. The installation program first does an extensive media check of the drive, then installs the driver and converts any existing data to compressed format.

On older Macs with slow hard drives, particularly if they are full of data, this can take a very long time—hours. You must have at least 5 percent free space, and no file can be larger than 25 percent of the total drive space. The speed of compression with TimesTwo is directly related to the speed of the Mac it is running on. On an SE or a Classic the performance drop can be painful—about 2.5 times slower, as Macworld Lab tests show.

If you install TimesTwo on a removable-media drive (like a SyQuest or Bernoulli), the driver stays with the media. This lets you increase the storage capacity of any removable medium regardless of what machine you use it on. You will need to use a mounting INIT like SCSI Probe to mount such disks, but Golden Triangle does not provide one with TimesTwo. Also, TimesTwo does not support partitioned hard drives; any existing partitions will be destroyed. (The company says a planned upgrade will provide these features.) TimesTwo is not compatible with security programs that protect volumes, folders, or files, and it cannot be safely installed on volumes with security software.

Unlike with file-level compressors, there is no way to deinstall TimesTwo. If for some reason you need to remove it from your hard drive, you have to back up all your data, then reformat the drive. TimesTwo, once installed, is much easier to use than the other products. There

ON-THE-FLY COMPRESSION PRODUCTS COMPARED

Company	Product	Tested by Macworld Lab	List Price	Compression Type	Minimum System Version Required	RAM Required	Consumer Contact: Toll
Aladdin Systems	StuffIt SpaceSaver	yes	$59.95	file-level	6.0.5	2MB	408/761-6200
Alysis Software Corporation	eDisk	no	$149.95	driver-level	6.0.5	1MB	415/566-2263
	More Disk Space *	yes	$99.95	file-level	6.0.5	1MB	415/566-2263
ETC Peripherals	DataPress	yes	$535.00	file-level	6.0.5	1MB	813/884-2863
Fifth Generation Systems	AutoDoubler	yes	$89.95	file-level	6.0.4	1MB	504/291-7221
Golden Triangle Computers	TimesTwo	yes	$149.00	driver-level	6.0.4	2MB	619/587-0110
Now Software	Now Compress	no	$99.00	file-level	6.0.7	1MB	503/274-2800
Stac Electronics	Stacker for Macintosh	no	$149.00	driver-level	6.0.5	1MB	619/431-7474

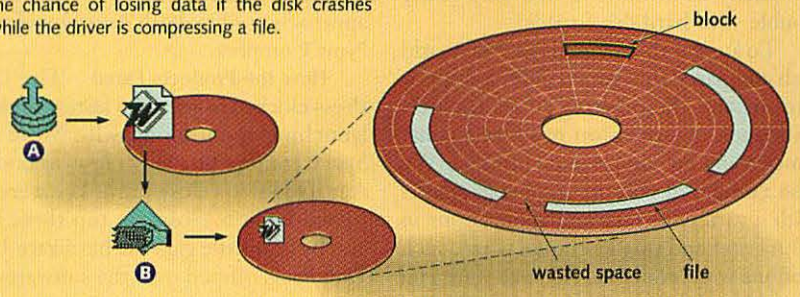
*Technical-support ratings are based on a series of calls made to each company by Macworld staffers (posing as customers) to gauge the accessibility, helpfulness, and accuracy of the company's bonuses and demerits, to derive the final rating. Ratings are for companies, not individual products, and we call only those companies whose products Macworld Lab tests. * Also sold as*

Compression Methods' Trade-offs

FILE-LEVEL COMPRESSION

Compressing Ⓐ The Mac's operating system, working with a disk driver, saves files to disk (just as it would without a compressor). Ⓑ Operating in the background, the compressor later finds saved files, compresses them, and once the compressed version is successfully saved, deletes the original file. This method is faster than driver-level compression, plus it reduces the chance of losing data if the disk crashes while the driver is compressing a file.

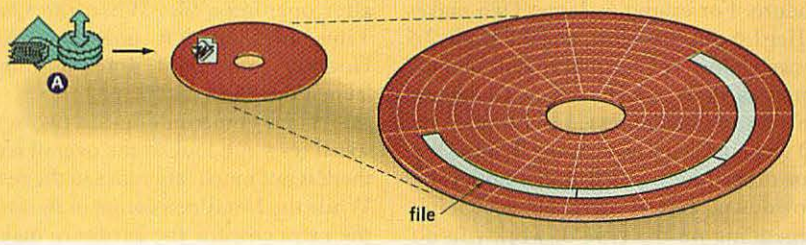
Storing The Mac's disk driver stores all files, decompressed or not, on a disk in blocks. The Mac's driver cannot put data from more than one file in a block. If a file, or piece of it, is smaller than the block, that leftover space is wasted. File-level compression does nothing to change this, and many blocks remain only partially filled.



DRIVER-LEVEL COMPRESSION

Compressing Ⓐ The Mac's operating system works with a disk driver that has been modified by the compression program. The modified driver does all compression as the file is being saved. This method is slower than file-level compression.

Storing A driver-level compressor produces more-compressed files than a file-level compressor, by writing to the disk in a more efficient structure than a standard driver. This modified driver enables blocks to hold data from more than one file, eliminating wasted space. But the nonstandard block structure can interfere with file recovery after a crash.



are no rules to set up, no options to choose, no need to use freeware decompressors or create self-extracting archives when exchanging data with others. Whenever you copy or move a file from a TimesTwo drive to anything else, that file is decompressed, plainly and transparently (except for the slowdown).

TimesTwo creates an invisible file on the hard drive to use as a buffer space. The version we tested (1.0.1) creates a very large buffer, so large in fact that on a 20MB drive where you would expect 40MB of free space after installing TimesTwo, you get only 30MB. The buffer shrinks as the drive fills, but you sometimes need to run an included utility to make this adjustment occur. The company says this changed in the next version, which shipped as we went to press, and all registered users will be sent a free upgrade. Other additions will include a removable-media mounting INIT, password protection for volumes, and driver code modified to be reentrant (this will save memory if you have more than one TimesTwo volume attached to your Mac).

Stacker for Macintosh Although Stacker had not been released at press time, we were able to get some details on it. Instead of replacing your existing hard-drive driver (as TimesTwo does), Stacker is essentially an add-on to your existing driver. This means Stacker should be able to support some security programs and partitioned hard drives, but it also means Stac Electronics must shoulder the burden of ensuring compatibility with a wide range of third-party drivers, both now and as they are updated.

Also, it's possible that installing a new driver, or a program (like a security program) that modifies the driver while Stacker is running, will cause a problem. Stac engineers were uncertain if they would be able to detect such changes, and they warn users to turn Stacker off before such modifications.

Stacker doesn't have the sort of large, invisible buffer file that TimesTwo does, and it does have an uninstall option. But Stac acknowledges that the compressor will not work with drives that use block sizes smaller than 512K, which means that data on older Bernoulli drives (all but the new MultiDisk 150 drives) cannot be compressed.

eDisk As we went to press, Alysis shipped eDisk. Alysis developed its own compression algorithm, rather than use a variant of the standard Lempel-Ziv compression algorithm. The company had not done tests to compare compression size or speed, so the benefits of using a different algorithm were unclear.

eDisk also differs in that it combines the functions of a file-level compressor with those of a driver-level one. In our quick look at the program, we saw that eDisk normally functions as a driver-level compressor, like Stacker, but there is also an optimization option that tells the program to search a disk for files that are not compressed or not fully compressed. Such files are then recompressed. This makes sense as an option, since eDisk can be set to have compression slowed (the Faster setting) or turned off (the Fastest setting). You might select such an option when dealing with time-intensive work, like saving large image files, and then have eDisk later compress those files. You do have to restart when you change settings, though.

According to Alysis, eDisk is not compatible with Apple's virtual memory because Apple does not release the specs. You can use virtual memory if you partition your drive and have the virtual memory active in an uncompressed partition. The company was unsure if eDisk was compatible with Connectix Corporation's Virtual or Compact Virtual programs, which give older Macs the ability to use virtual memory.

Consumer Contact: Toll-Free	Technical-Support Rating
none	good
800/825-9747	not tested
800/825-9747	satisfactory
800/876-4382	very good
800/873-4384	poor
800/326-1858	excellent
800/237-3611	not tested
800/552-7822	not tested

support technicians. Macworld uses a point system, including part of Alysis's $119.95 SuperDisk utilities package.

Testing Compatibility

NOW COMPRESS REQUIRES AT LEAST SYSTEM 6.0.7. The other products will work with earlier versions of the System (see "On-the-Fly Compression Products Compared"). We did our testing with System 7.1.

In Macworld Lab tests, we were pleasantly surprised to find only a single compatibility issue: More Disk Space corrupted a QuickTime file when we tried to read it. Repeated attempts to resolve this failed. Since DataPress uses More Disk Space, it had the same QuickTime file problem.

We also tested how gracefully all products handle running out of hard drive space. In all cases we got at least one alert dialog box letting us know we were out of space. TimesTwo gave us three different alerts, depending on how full the drive was. The initial alert let us know we were running low on free space on the drive, the second was much more strident in its warning, and the third told us we had run out of free space. We encountered no problem even when we ignored these alerts.

Although there is a lot of fear about reliability, we did not find it to be a significant concern.

A more significant, related concern is data recovery if a drive crashes. Scott Gaidano, president of DriveSavers, a Macintosh data-recovery company in Novato, California, believes that the use of compression products complicates the recovery of data from failed drives. "All of these products add a new layer of code that in the case of data loss has to be recovered perfectly to get data back," he cautions. "To recover a word processing file, you can attempt to recover [at least some of it] as a text file, but if it has been compressed, that approach doesn't work. You need to get the entire file," he explains. Gaidano recommends that users of compressors back up more frequently: "You need more backups than you would normally do."

Despite these misgivings, Gaidano does see value for driver-level compressors when used with removable media. "There's no risk here, since the original file still exists," he says.

We also tested technical support by calling companies several times without revealing that we were from *Macworld*, so we could gauge how well customers are served. We had poor response from Fifth Generation Systems for its AutoDoubler product; the technicians were neither knowledgeable nor helpful. We had a satisfactory response from Alysis for More Disk Space, but we were concerned that the company had only one support technician to service the product and that he worked at home half the time. Although the company gave us his home number, that low amount of available support is troubling.

Testing Speed and Size

THE BIGGEST ISSUES FOR ON-THE-FLY compression products are how much time they take to do it and the amount of compression: Can you use these tools in a workaday environment? Do they really double your hard drive space?

To answer these questions, Macworld Lab compared the launch times for applications and the opening times for files with each compression product against times using no compression product. We also compared compression size results with a variety of files and applications in both faster and smaller modes where such options were available. All tests were run on a Mac IIci with a cache card, 8MB of RAM, and an 80MB Quantum hard drive. "How Disk Compressors Stack Up" shows the test results.

We ran a second set of tests on a Classic with 4MB of RAM and a 40MB hard drive. These tests convinced us that using any of these products on 68000-based Macs (the Plus, SE, Classic, and PowerBook 100) is a process too painful to endure. For example, TimesTwo makes a IIci 1.6 times as slow, and a Classic 2.5 times as slow. A Classic is already about 2 times as slow as a IIci—so a 10-second save on an uncompressed IIci would take 50 seconds on a Classic using TimesTwo. For other Macs, you'll find a noticeable slowdown, but it may be acceptable depending on the type of work you do. We'd be uncomfortable using them even on an LC or a Mac II.

What to Keep in Mind The more work you do with files—such as using programs like Adobe Photoshop that use temp files, or opening and closing many files each day—the less you'll like the slowdown.

How you interact with your files also has a bearing on the performance you'll get, since compression programs handle compression differently. For example, AutoDoubler reads files in their compressed form directly into memory and only decompresses a file if changes need to be written back to the disk. (Some applications store data within themselves as resources, in which case AutoDoubler must decompress the application to get such data.) Resource compression is often faster when opening files and launching applications. But if there are changes to a file, this as-needed decompression slows down system performance when you need to save, since the program must decompress the file before making changes to it, and then recompress the file. Now Compress also uses this method.

In contrast, SpaceSaver and More Disk Space decompress a file or application when opening or launching it. This makes saving changes faster when (and if) you do make the save. Of course, you have to wait as the file decompresses when you open it, but people tend to open a file just once and save it more often. So this approach is faster on the whole than the approach used by both AutoDoubler and Now Compress.

How the Products Fared The DataPress clocked in with the fastest times for launching applications, with More Disk Space coming in a very close second and AutoDoubler a close third. We were surprised by how close the top three were and by how little gain the hardware-based DataPress offered over the software-only products.

When we checked the times for opening documents, SpaceSaver was in the lead regardless of which compression technique we used, AutoDoubler came in second when we used a locked QuickTime file, and the DataPress came in third. Locking the QuickTime file saved time by preventing MoviePlayer from its default action of writing back to disk after opening a file. When the QuickTime file was left unlocked, AutoDoubler took eight times as long to launch the file.

When you combine the two sets of speed tests and look at the overall scores, there is not much difference in the results. While the DataPress comes in the fastest, the extra cost for the hardware makes it hard to justify its purchase if all you gain is a very little in speed—especially since it didn't compress very much.

The size tests also show marginal differences among the three software-based products. Most users will see no meaningful differences. On smaller hard drives (40MB or less), the System Folder can take as much as 25 percent of the total drive space, and a driver-level compression scheme like that in TimesTwo handles System Folder compression more easily than a file-level compressor does. However, Macs likely to have 20MB or 40MB drives may not be fast enough for you to tolerate the performance loss of the driver-based approach.

If you place a higher value on speed or size alone, and you factor in the performance of your system, the differences among products may be less marginal. We see it as too close a call to recommend one over another, and you'll note that we've made no Editors' Choice for any of these products.

How Disk Compressors Stack Up

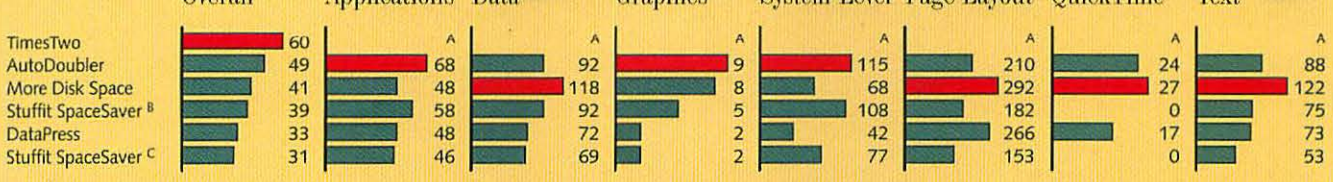
Red indicates best result in test. Products are listed in order of overall performance.

On-the-fly disk-compression programs make more disk space available by applying a mathematical algorithm to the sequence of bytes that make up applications and files to reduce their size. However, this efficiency in space comes at a cost: slower access times.

HOW MUCH SPACE COMPRESSORS ADD TO A DRIVE

Numbers represent how much more space a compressor adds, in percent of original drive capacity.

The compression algorithms used (most are variants on the Lempel-Ziv algorithm) are more successful with some file types than with others. You will see no difference for driver-level compressors like TimesTwo because they compress not just the files but also the disk file structure (see *Lab Notes*, this issue). To figure out how much total room a product would give you, multiply your drive size by the percentage for the product below, and then add the result to the drive's original size (for example, TimesTwo's 60 percent compression would give an 80MB drive 128MB of capacity).



HOW MUCH COMPRESSORS SLOW DOWN A MAC

Times slower than without compression. (Performance without compression is 1.0.) L = launch application; O = open file.

The compression algorithm takes time to apply, which is why Macs run more slowly with a compressor. Some vendors have reduced the performance penalty by optimizing how the algorithm works. The slowdown varies between application launching and file opening, so we tested both tasks. To figure out your actual slowdown, multiply the results below by how long your tasks now take. For example, TimesTwo's 1.6 times overall slowdown means a 30-second task on a Mac IIci would take 48 seconds.

	Overall	Photoshop		PageMaker		MoviePlayer		FileMaker		MacDraw		Excel		Word	
		L	O	L	O	L	O	L	O	L	O	L	O	L	O
Macintosh IIci	1.0														
DataPress	1.3	1.1	1.0	1.2	2.1	1.1	D	1.0	1.7	1.5	1.4	1.1	1.3	0.9	1.1
AutoDoubler E	1.3	1.4	1.2	1.7	1.7	1.3	1.1	1.4	1.6	1.3	1.2	1.2	1.2	1.1	1.3
More Disk Space	1.4	1.1	1.5	1.2	2.0	1.2	D	1.1	1.6	1.5	1.4	1.1	1.9	1.0	1.1
StuffIt SpaceSaver C	1.4	1.5	1.0	1.6	1.7	1.7	1.3	1.5	1.3	1.6	1.0	2.0	1.2	1.5	1.3
StuffIt SpaceSaver B	1.5	1.6	1.0	1.7	1.8	1.7	1.2	1.7	1.4	1.8	1.0	2.4	1.2	1.6	1.3
TimesTwo	1.6	1.3	3.5	1.9	1.5	1.4	1.8	1.8	1.7	1.7	1.0	1.8	1.2	1.3	1.0
Macintosh Classic	1														
DataPress	1.5	F	F	1.5	2.3	F	F	1.2	2.0	1.6	1.8	1.3	1.3	1.0	1.2
StuffIt SpaceSaver C	1.6	F	F	1.7	2.2	F	F	1.9	1.5	1.7	1.0	2.0	1.1	1.6	1.5
More Disk Space	1.7	F	F	1.5	3.9	F	F	1.3	2.4	1.5	1.7	1.2	1.7	1.0	1.2
AutoDoubler E	2.0	F	F	2.6	3.2	F	F	2.1	2.6	1.9	1.5	1.5	1.3	1.5	1.5
StuffIt SpaceSaver B	2.1	F	F	2.2	2.7	F	F	2.4	1.9	2.2	1.0	3.3	1.2	2.2	1.5
TimesTwo	2.5	F	F	3.6	2.5	F	F	3.3	3.3	3.2	1.4	2.9	1.4	2.6	1.1

A TimesTwo reports the same number of bytes for a compressed file as it would for the same file on an uncompressed disk, so it is not possible to calculate the savings for individual files. B Smaller compression enabled. C Faster compression enabled. D The Mac locked up during MoviePlayer tests. Overall results show faster performance than the product would be likely to have achieved had it worked with MoviePlayer. E Using standard settings. We tried to use the AutoDoubler Internal Compressor (AIC) settings, but the program could not work with PageMaker, Word, or Excel. With other programs, it performed about 25 percent faster with AIC settings. F Photoshop and QuickTime require more resources than a Classic has, so we did not test these applications on the Classic.

Does Compression Make Sense?

GIVEN THE SLOWDOWN THEY CAUSE and the uncertainty they bring to file recovery, compressors make users justifiably wary. It's fair to wonder if compressors are just too good to be true.

Compression makes sense for archiving, but you can use programs such as the shareware StuffIt Lite from Aladdin Systems (408/761-6200) or any backup utility for archiving, compressing only those archived files that are stored on floppies, removable media, or external hard drives.

PowerBook users limited to a small internal drive may benefit from on-the-fly compression, but they can benefit more by adding an external drive. You can simulate the convenience of a Duo Dock by keeping applications and documents that you will need everywhere you go on the PowerBook's drive and keeping the items that you use at just one location (say at the office or at home) on the external drive. It's worth noting that both AutoDoubler and SpaceSaver have special PowerBook modes that keep them from doing background compression while the PowerBook is running on battery power. You need that feature because disk access consumes a fair amount of a PowerBook's limited battery power.

Overall, it's difficult to recommend on-the-fly compression. File-recovery expert Gaidano considers the promised savings from these products to be an illusion: "It's much more economical to get a larger drive. You gain in both data integrity and performance. You pay a performance price for the extra disk space that over the long term is not worth the savings you get by putting off the purchase of a larger hard drive."

We agree. A few hundred dollars is not to be sneezed at, but the time wasted by compression slowdown over the lifetime of your drive has an even greater value. m

MATTHEW LEEDS is the technical-services manager for a major software developer.

Macworld Lab testing supervised by MARK HURLOW.

SUPERSONIC STORAGE

Macworld Lab tests high-speed hard drives and disk arrays

BY JIM HEID

The range of high-performance storage offerings changes so quickly that it's almost impossible to take a snapshot of them without getting a blurry image. This derives, in part, from increasing complexity. Forthcoming hard drive mechanisms promise superb performance but then require special adapter boards and innovative approaches to SCSI cabling.

And Apple has altered the market recently by including 500MB or 1GB hard drives in several Mac models, and by introducing a family of network file servers that use a high-speed SCSI controller board. These developments are spurring third-party storage companies to lower prices and develop more innovative products that set them apart from an increasingly competitive pack.

For this article, Macworld Lab tested 30 hard drives, ranging in capacity from 1GB to 2.9GB, and in price from $1269 to $7595. We also tested several lightning-fast disk *arrays*—aptly named because you may need a raise to afford one. Actually, arrays combine two or more hard drives with specialized controller circuitry to provide faster performance or greater reliability than a conventional drive can deliver. Prices for most configurations start above $4000 and rise into the tens of thousands of dollars for the most elaborate systems. We also looked at four SCSI adapter boards whose SCSI ports can transfer data more quickly than those built into most Macs.

If your storage needs or budget is more modest, you'll find roundups of midrange drives in "Midsize Hard Drives" (*Macworld*, March 1993), and of entry-level drives in "Low-Capacity Hard Drives" (August 1992). But if you're in the market for a high-end hard drive—whether to store multimedia productions, color images, or an officeful of documents and applications—the latest developments in high-end storage could affect your purchasing plans. Besides evaluating what's available now, I'll also forecast upcoming technologies and issues.

More for Less

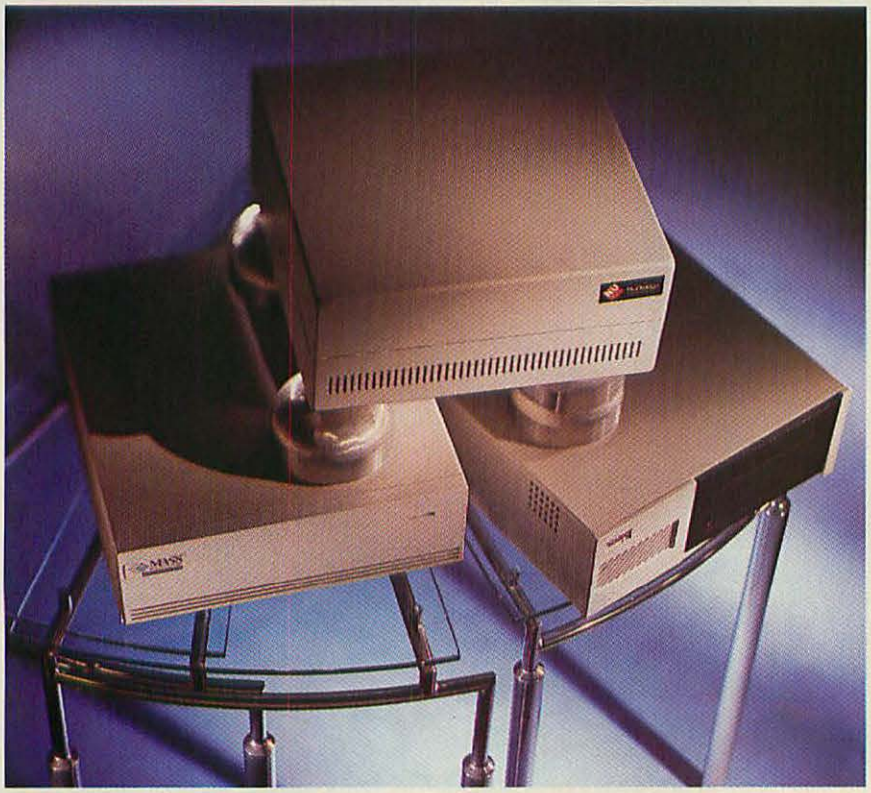
The best news in hard drives is good news for hard times: prices are falling. In May 1992, when we last surveyed the summit of storage, the least expensive 520MB drive, from mail-order vendor Club Mac, cost $1309; this year, you can buy the same basic drive from mail-order vendor MacDirect

PHOTOGRAPHS BY MARK JOHANN

Fast performers: The Optima Technology MiniPak 1000 (top), the Saturae Edge 1000r (middle), and the PLI MiniArray 040 (bottom).

for $998. Last time around, a 1GB drive from FWB cost $5099; today, a faster version of the same drive retails for $2349. Prices may fall even more during the next several months, as drive vendors ramp up production and try to compete with the internal drives supplied in new Macintoshes. Apple's entry into high-capacity storage has helped force prices down just as its 68040-based Centris machines drove down accelerator board prices earlier this year.

As prices for hard drives are going down, capacities are going up. Many high-capacity drives still use 5.25-inch disk platters, but a growing number use smaller, 3.5-inch mechanisms. Last year, only drives in the 500MB ballpark were available in the 3.5-inch size; this time, we tested numerous 1GB 3.5-inch drives, and by the time you read this, capacities of up to 2GB should be available in the 3.5-inch package. Within a year, 5.25-inch drives may be the exception rather than the rule in the personal computer world.



Among the faster drives were the Mac USA NuDesign 1.2 (top), the Mass Microsystems MassterDrive 2780 (left), and the Relax Technology Vista 3.5GB (right).

As a result, some gigabyte-size drives fit inside a briefcase. Portable drives tested include (from smallest to largest) TMS Peripherals' Shadow Compact Portable, Liberty Systems' 70 Series 1.2 GB drive, La Cie's Tsunami 1225, Optima's Mini-Pak, and MacWarehouse Power User Pro. All use 3.5-inch mechanisms. The remaining drives vary in size, with most using either shoebox-size cases or zero-footprint cases, designed to fit beneath a compact Mac.

If you prefer an internal drive—for the extra security it provides or simply to control desktop clutter—the downsizing trend means you're more likely to find a high-capacity drive that will fit inside your Mac. Only the Mac II, IIx, IIvx, IIfx, Centris 610 and 650, Quadra 800, 900, and 950 models can accommodate an internal 5.25-inch drive; the other members of the desktop Mac family require 3.5-inch drives.

The trend toward 3.5-inch mechanisms helps performance, too. For one thing, bits are packed more closely in a smaller mechanism, allowing more bits to pass more rapidly beneath the drive's heads. For another, a smaller mechanism has lighter heads, and those heads do not have to travel as far to move from one edge of the disk platters to the other. This results in shorter seek times—the

SURVEYING SCSI ADAPTERS

Company	Phone	Toll-Free Phone	Product	Tested by Macworld Lab	List Price	Supports SCSI-2 (Fast/Wide)	Uses DMA Transfers
Atto Technology	716/688-4259	○	Silicon Express II	●	$795	●/○	●
Conley Corporation	212/979-8824	○	SHA-100	○	$995	●/○	●
DayStar	404/967-2077	800/962-2077	DiskRunner	○	$799 *	○/○	●
Dynatek	416/636-3000	○	Mach II	○	$795	●/○	●
FWB	415/474-8055	○	SCSI JackHammer	○	$999 **	●/●	●
Loviél Computer	612/828-6880	800/688-3696	Arrow	○	$899	●/●	●
			SCSI Bolt	○	$899	●/●	●
MacProducts USA	512/472-8881	800/622-3475	Magic SCSI II	○	$299	●/○	●
Mass Microsystems	408/522-1260	800/522-7979	Fast SCSI-2 Board	○	$899	●/●	●
MicroNet Technology	714/581-1540	○	SS-414NP ***	●	$1995	●/○	○
PLI	510/657-2211	800/288-8754	QuickSCSI	●	$499	○/○	○
Procom Technology	714/852-1000	800/800-8600	Nu 32 SCSI Enabler	○	$995	●/○	●
Storage Dimensions	408/954-0710	○	Data Cannon PDS/FX	○	$639	●/○	●
			Data Cannon PDS/Quadra Fast	●	$799	●/○	●
			Data Cannon PDS/Quadra Wide	○	$1199	○/●	●

● = yes; ○ = no. * Memory must be purchased separately. ** $799 with drive purchase. *** MicroNet's NuPort-II SCSI-2 adapter is sold with a hard drive mechanism. Capacities range

time required for the heads to reach a given track.

Rather than list every one of the more than 200 drives we identified in the 550MB-and-up capacity range, we provide details on the products we actually tested (see "Vital Stats on Tested Drives"). As you shop, keep in mind that far more drives are available from the vendors we list and others.

Faster and Faster

FOR COLOR PUBLISHERS, A HARD DRIVE can't be too fast. Prepress professionals lose money every time they drum their fingers waiting for Adobe Photoshop images to open or save. Fast, high-capacity hard drives are also essential for professional-quality video work. And they're the mainstays of network file servers that supply programs and documents to an office full of computers. A fast hard drive enables a server to keep up with the data demands of the users connected to it.

The latest drives meet these challenges. The widespread availability of mechanisms such as Seagate's Elite-2 and Elite-3 and DEC's DSP3105S make this year's crop of hard drives faster as a group than last year's. One reason the drives with these mechanisms are faster is that their internal platters spin faster. A fast *spindle speed* allows for a faster data-transfer rate, since more bits pass beneath the drive's heads each second. A fast spindle speed also lowers *latency*—the time it takes for a particular spot on the drive's platters to reach the drive's heads.

Last year, the fastest drives had spindle speeds of 4500 and 5400 revolutions per minute, compared with the 3600-rpm speed most other drives used. Maxtor's 1.2GB mechanism has since raised the speed limit to 6300 rpm. Seagate has also announced 6300-rpm mechanisms, and the firm's forthcoming Barracuda drives will run at 7200 rpm—a dizzying 120 revolutions per second.

But this extra speed is wasted if the Mac can't keep up. The fastest hard drives can send and receive data faster than any Mac except a Quadra or Centris 650. On a slower Mac, an ultrafast drive twiddles its digital thumbs as it waits for the bus—the SCSI bus.

SCSI Goes Fast—and Wide

THE FACT THAT A FAST DRIVE DEMANDS a fast input/output bus has helped spur development of an updated version of the SCSI specification, called *SCSI-2*. Understanding what SCSI-2 does and does not provide is an important first step in creating a performance-tuned storage system.

The most basic aspect of SCSI-2 involves an updated set of the commands that SCSI devices use when conversing. This aspect of SCSI-2 does not address performance; rather, it simply defines a new vocabulary for devices to use when communicating.

The aspects of SCSI-2 that do address performance are two data-transfer techniques called Fast and Wide. SCSI-2 Fast is just that—it describes new timing and data-packaging methods that boost the speed at which data can travel over a SCSI bus. SCSI-2 Fast allows for maximum sustained transfer rates of 10MB per second—twice the rate of standard SCSI.

SCSI-2 Wide doubles the number of data pathways from 8 to 16. The combination of SCSI-2 Fast and Wide allow for maximum data-transfer rates of 20MB per second. When 32-bit Wide devices appear in the future, that theoretical rate will double to 40MB per second. (And SCSI isn't stopping there—the industry is already starting to talk about SCSI-3, which will support fiber-optic connections that promise gigabyte-per-second transfer rates.)

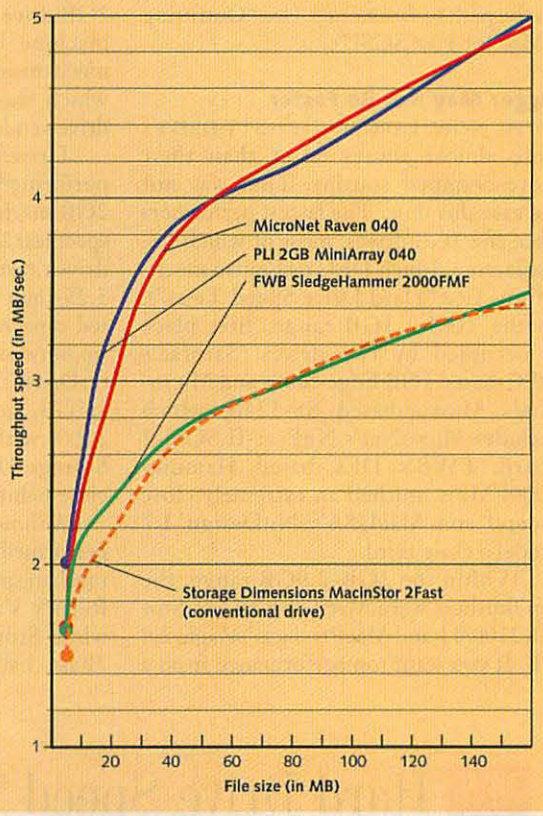
Encouraging as this sounds, SCSI-2 and its Fast and Wide variants have created fertile ground for confusion and advertising hype. The problem is that most current hard drive mechanisms are advertised as supporting SCSI-2, when many merely understand the SCSI-2 command set and don't incorporate Fast or Wide features. Such a drive is unlikely to be any faster than a standard SCSI drive (assuming all other factors are equal). If you're shopping for a fast drive, go beyond claims of SCSI-2 compatibility and look for SCSI-2 Fast or Wide.

Numerous SCSI-2 Fast drives are now available. Drives incorporating both SCSI-2 Fast and Wide were just beginning to ship at this writing. But both technologies place their own technical hurdles

MW LAB When Do Arrays Pay Off?

With relatively small files, RAID Level 0 arrays perform in the range of the fastest conventional hard drives. We used Adobe Photoshop files to demonstrate how large files must be before the speed benefits of RAID 0 are apparent. In the process of creating a working copy and an undo file, Photoshop 2.0 transfers five times the amount of data present in the original file. Thus, Photoshop transfers 100MB when opening a 20MB image.

When Photoshop file sizes reach 20MB or so (100MB of data transferred), the benefits of the fastest arrays over standard hard drives emerge. The MicroNet Raven 040 and PLI MiniArray 040 achieved sustained data-transfer rates of about 5MB per second—almost twice the pace of a fast conventional drive, the Storage Dimensions MacinStor 2 Fast, which uses the Seagate Elite 3 mechanism. The larger the file, the stronger the argument for a Level 0 array. But not all Level 0 arrays show performance benefits even for large files, as seen with FWB's SledgeHammer 2000FMF. All systems were tested using a Quadra 950.



Size of RAM Cache	Type of Slot Required	Warranty Period (in months)
none	NuBus	12
none	PDS (Quadra family, Centris 650, Workgroup Server 80)	12
1MB–16MB *	NuBus	36
none	NuBus	12
128K	NuBus	24
none	NuBus	12
none	PDS (IIfx)	12
none	NuBus	12
none	NuBus	60
none	NuBus	12
none	NuBus	60
none	NuBus	12
none	PDS (IIfx)	24
none	PDS (Quadra)	24
none	PDS (Quadra)	24

from 400MB (listed here) to 2.7GB, which retails for $7395.

on the path to fast storage (see "Outfitting a Mac for Fast SCSI").

Bigger May Not Be Faster

UNTIL NOW, LARGER-CAPACITY DRIVES were almost always faster than their more-cramped cousins. That was not the case this time. The fastest performers were the 1GB drives, most of which use the latest 3.5-inch DEC or Fujitsu mechanisms (see "Hard Drive Speed Tests"). In the 1GB–1.3GB range, first place is occupied by two drives: Saturae's DEC-based 1GB Edge 1000r and MicroNet's Maxtor-based SS-1240, which includes MicroNet's NuPort-II SCSI-2 board. FWB's DEC-based Hammer 1000FMFis finished an extremely close second and MacUSA's NuDesign 1.2 model a close third.

Within the 2GB–2.9GB range, the top finishers were MacTown's Data Stor HK2100/11 and MacProducts' Magic 2.4 GB. If you want top performance from a 2GB drive, you might want to wait for a machine built around a fast 3.5-inch mechanism such as Seagate's Barracuda 2, which was just becoming available to drive vendors at this writing.

Drives in the 2.7GB–2.9GB range performed faster as a group than the 2GB machines but were slower than the speediest 1GB drives. (Each of the 2.7GB drives tested used a Seagate Elite 3, a 5.25-inch mechanism whose unformatted capacity is 3.5GB.) First place was a tie between Mass Microsystems' MassterDrive 2780, Relax Technology's Vista 3.5GB, and Microtech's Nova XL 2700, with Procom's MTD 2900 and Storage Dimensions' MacinStor 2Fast close behind.

Although all the 2.7GB–2.9GB drives performed similarly and contain identical mechanisms, they aren't priced similarly: Relax's Vista 3.5GB retails for $3499, while Storage Dimensions' MacinStor 2Fast lists for $6369. The Storage Dimensions drive includes more sophisticated formatting software that offers a mirroring option—a worthwhile feature, but hardly worth the extra $2870. And did I mention that Relax gives you a five-year warranty, which Storage Dimensions charges extra for?

Similar price disparities exist throughout the hard drive world. The vendors of premium-price drives say they have more stringent quality-control measures and use heavier-duty power supplies and other internal components. The drives I've opened up over the years bear out the latter claim, but at the same time, I haven't seen any evidence that proves mail-order drives are less reliable over the long haul.

As for quality of technical support, we found wide variations among mail-order vendors. Two firms—Relax and MacUSA—scored poorly, but several others, including APS, Club Mac, La Cie, and Third Wave, scored very good to excel-

MW LAB Hard Drive Speed Tests: 1GB to 2.9GB

All times are in seconds.

Color Key
- Fastest
- **Percent slower than fastest drive**
- Up to 10%
- 11%–20%
- 21%–29%
- 30% or more

The drives are listed from fastest (top) to slowest (bottom). To determine rankings, Macworld Lab indexed test results against the fastest drive in each test exept noise. Thus, the Saturae Edge 1000r gets a 1.00, and the Dynatek HDA1.2 gets a 0.72. Index numbers are listed to the left of the product names.

We measured each drive's ability to duplicate a 3.2MB file and a 3.2MB folder, to search a 4th Dimension database for a specific record, and to compile code in Think C. We also averaged each drive's speeds for opening and saving files from several applications, including Aldus PageMaker and Microsoft Excel. In the noise tests, the lower the decibel level, the quieter the drive. Drives with decibel levels in the upper 40s were noisy enough to be irritating.

		Duplicate	Open	Save	Search	Compile	Noise (in decibels)
Overall Fastest	**1.00** Saturae Edge 1000r (D)	16.0	26.2	16.8	13.2	11.6	36.0
	1.00 MicroNet SS-1240 (M)	16.0	24.5	19.4	15.1	11.0	38.9
	0.99 FWB Hammer 1000FMFis (D)	16.3	29.1	16.7	13.7	11.0	37.6
	0.98 MacUSA NuDesign 1.2 (F)	15.0	26.2	19.8	16.0	12.1	37.7
	0.93 Mass Microsystems MassterDrive 2780 (S)	20.1	25.6	21.8	12.8	12.7	45.9
	0.93 Relax Vista 3.5GB (S)	20.0	25.6	22.6	12.8	12.4	51.9
	0.93 Microtech Nova XL 2700 (S)	19.7	25.6	22.7	12.8	12.7	43.8
	0.92 Optima MiniPak 1000 (M)	19.2	24.4	20.9	15.2	12.6	41.6
	0.92 TMS Shadow Compact Portable (Q)	17.3	28.2	20.1	14.5	13.3	39.7
	0.91 Procom Technology MTD 2900 (S)	20.4	28.1	22.2	12.8	12.4	46.1
	0.91 Liberty 70 Series 1.2 GB (Q)	17.1	28.2	20.3	14.8	13.7	41.4
	0.91 Storage Dimensions MacinStor 2Fast (S)	21.1	26.6	21.6	13.3	12.5	49.4
	0.90 Club Mac 1240MX (M)	19.2	24.6	20.9	15.0	14.3	41.1
	0.90 ETC Peripherals 1225 (Q)	17.2	28.3	21.1	14.9	13.5	42.0
	0.90 APS F1.2 (F)	19.4	26.4	21.9	14.4	12.9	44.7
	0.89 Loviël 1225 (Q)	17.7	31.0	20.6	14.8	13.2	39.5
	0.88 La Cie Tsunami 1225 (Q)	17.5	32.6	21.2	14.7	13.3	40.5
	0.87 MacWarehouse PowerUser Pro (D)	21.6	27.7	21.8	13.8	13.4	42.7
	0.86 Spin Peripherals Cyclone 1 Gb (D)	22.0	27.4	21.5	13.9	13.6	41.3
	0.85 Hard Drives International PowerDrive 1750 (F)	23.2	28.0	24.0	13.8	13.0	43.4
	0.84 MacTown Data Stor HK2100/11 (S)	20.4	28.5	24.2	16.2	13.1	45.5
	0.82 GCC Technologies UltraDrive 1300X (S)	21.8	26.6	23.8	16.9	13.8	41.5
	0.81 Mirror 1GB External (Q)	22.9	28.6	24.5	15.0	14.9	38.6
	0.80 Total Peripherals Quantum 1.2GX (Q)	20.7	32.1	24.4	15.3	14.3	43.7
	0.77 MacProducts USA Magic 2.4 GB (S)	26.0	32.0	22.9	15.3	15.2	43.8
	0.75 Tulin A-Hive 2100 (MI)	22.0	29.3	29.3	18.9	15.0	42.5
	0.75 Focus Enhancements Focus 2.1GB XXL (MI)	22.3	29.6	28.9	18.9	15.1	42.8
	0.74 CMS Enhancements PD 2100-II (MI)	22.5	29.4	29.5	18.9	15.1	37.1
	0.73 Third Wave I.2X (F)	25.9	32.6	28.4	15.5	16.0	42.8
Overall Slowest	**0.72** Dynatek HDA1.2 (I)	26.4	35.2	28.8	15.5	15.6	35.3

Mechanism key: D = DEC; F = Fujitsu; I = IBM; M = Maxtor; MI = Micropolis; S = Seagate; Q = Quantum

Outfitting a Mac for Fast SCSI

Unless you have a Quadra or Centris 650, you can't just buy a SCSI-2 Fast drive and expect to be up and flying. To allow a slower Mac to take full advantage of a fast drive, you need a SCSI-2 adapter. These are sometimes called SCSI accelerators, but the term can be misleading, since most adapters don't speed up the Mac's existing SCSI bus but instead add a SCSI-2 bus.

SCSI-2 adapters are available that install in a NuBus expansion slot or in the Processor Direct Slot (PDS) of a Quadra or Mac IIfx (see the table "Surveying SCSI Adapters").

A PDS-based SCSI-2 adapter can provide a significantly bigger performance boost than a NuBus adapter because the PDS has faster data-transfer speeds. If you have a Quadra or a IIfx, consider a PDS-based SCSI-2 adapter such as Storage Dimensions' Data Cannon PDS/FX (which supports SCSI-2 Fast mode) or the Data Cannon PDS/Quadra (which comes in a Fast version and a Wide version). A larger selection of NuBus SCSI-2 adapters is available, probably because manufacturers don't have to design separate boards for each Macintosh model.

Macworld Lab tested PLI's QuickSCSI, Storage Dimensions' Data Cannon PDS/Quadra Fast, MicroNet's NuPort II, and Atto's Silicon Express II. All of those units performed similarly, with first place shared by the PLI and Storage Dimensions boards.

One reason the Mac's built-in SCSI circuitry and driver software limit performance is that they require the computer's central processing unit (CPU) to be intimately involved in SCSI data transfers. The CPU must help supervise the transfer of every byte over the bus—a technique called *asynchronous transfer.* A more-efficient way to ride the bus is through *synchronous transfers,* in which CPU-drive handshaking occurs less frequently. Most SCSI-2 adapters implement synchronous transfers as well as a data-transfer technique called *direct memory access* (DMA), which further reduces the role the Mac's CPU must play in moving data to and from the drive. SCSI-2 adapters that do not use DMA don't provide as high a maximum data-transfer rate.

A SCSI-2 adapter provides at least one advantage that goes beyond speed. By adding a second SCSI bus to a Macintosh, you double the number of SCSI devices you can connect. To maximize the efficiency of both SCSI buses, put all scanners, printers, optical drives, and SCSI-1 hard drives on the Mac's built-in SCSI bus, and reserve the SCSI-2 bus for SCSI-2 hard drives.

SCSI Adapter Alternatives

If you want to speed up your Mac's overall performance as well as its SCSI transfer rate, you might consider pairing a Radius Rocket accelerator with Radius's $299 SCSI-2 Booster, a piggyback board that attaches to the Processor Direct Slot that all Rockets have. A Radius Rocket ($1199–$2499; 408/434-1010) provides one of the best performance kicks for Mac II–class machines, but has some compatibility problems with QuickTime and sound-oriented products (see the series of articles on Macintosh upgrades, *Macworld,* June 1993). The Rocket also provides exotic multiprocessing capabilities when used with Radius's RocketShare software.

In the RocketShare environment, the SCSI-2 Booster has some appeal. Thanks to RocketShare's multiprocessing capabilities, you can start transferring megabytes of data across the SCSI-2 Booster's bus, and then switch back to the Mac's logic board (or to yet another Rocket) to work in a different program. This could save time for people who use a scanner or SCSI-based printer extensively.

Think twice about adding a SCSI-2 Booster to a Rocket if you don't use RocketShare, however. Without RocketShare, you can't use a drive connected to the SCSI-2 Booster as a start-up drive. Another drawback to the SCSI-2 Booster is that you can't connect an internal hard drive to it. Most other SCSI-2 adapters have a special connector for an internal drive.

You should also consider a product from DayStar Digital, the DiskRunner, formerly known as the SCSI PowerCard. This board, which sports its own 68000 processor and can accommodate up to 16MB of SIMM-based memory, can accurately be described as a SCSI accelerator: by caching data in its memory, it can effectively speed up an older hard drive, a removable-media SyQuest or Bernoulli drive, or even a CD-ROM player.

Finally, there's the new Apple Workgroup Server 95 PDS Card, which is the input/output cornerstone of the new Workgroup Server line (see *News, Macworld,* May 1993). The Workgroup Server 95 PDS Card provides cache memory that reduces the need for disk accesses, and sports a SCSI/DMA controller chip that provides DMA transfers, freeing the Mac's CPU for other tasks.

Unlike the other SCSI adapters described here, the Workgroup Server 95 PDS Card isn't designed to be a general-purpose SCSI booster; it's part of an upgrade package that turns a Quadra 900 or 950 into a Workgroup Server 95. The package includes A/UX, Apple's version of the multitasking Unix operating system. Because it includes this software, the board is considerably more expensive than the other adapters described here, retailing for $2499.

MW LAB SCSI Adapter Performance

Times are in seconds.

Color Key
Fastest
Percent slower than fastest adapter
Up to 10%
11 to 20%

		Duplicate	Open	Save	Search	Compile
1.00	PLI QuickSCSI	15.9	26.4	16.5	13.6	11.6
1.00	Storage Dimensions Data Cannon*	15.5	26.7	16.2	14.7	11.4
0.97	MicroNet SS-414NP (NuPort II)	16.1	25.2	19.3	15.2	11.5
0.92	Atto Silicon Express II	18.1	28.5	17.2	15.7	12.1

**PDS/Quadra Fast model*

The boards are listed from fastest (top) to slowest (bottom). To determine rankings, Macworld Lab indexed test results against the fastest drive in each test. Index numbers are listed to the left of the product names.

We measured each SCSI adapter's ability to duplicate a 3.2MB file and a 3.2MB folder, search a 4th Dimension database for a specific record, and compile code in Think C. Using a Quadra 950 as the test computer, we also averaged speeds for opening and saving files from several applications, including Aldus PageMaker and Microsoft Excel. The test drive was the FWB Hammer 1000FMFis (except for the MicroNet, which was used in a MicroNet NuPort II system); all SCSI adapters were tested in the default configuration.

The FWB SledgeHammer2000FMF (top) performed far below MicroNet's Raven 040 array (two drives on bottom) in the critical throughput speed tests.

lent. Shop carefully and let your budget be your guide.

Negotiating Arrays

FOR TASKS THAT INVOLVE TRANSFERring hundreds of megabytes at a time, you'll get the best performance from a disk array, which combines two or more drive mechanisms with specialized controller circuitry and driver software that fools the Mac into thinking that it's communicating with a single drive.

Disk arrays come in several flavors, with each described according to a framework called a *RAID*—redundant array of inexpensive disks. RAID Level 0—the only level we evaluated for this article—is the simplest and least expensive; it uses a technique called *data striping* to split data evenly across two drives, boosting data-transfer rates by allowing disk reads and writes to occur simultaneously. The drawback is that the array is only half as reliable as a single mechanism—if one mechanism fails, you lose the contents of both. Despite the acronym's first letter, there's no redundancy in Level 0 RAID. But that drawback is minor if you back up regularly (and only a fool uses any hard drive without doing so).

The redundancy aspects of RAID surface in Levels 1 through 5. By using complex data-recording techniques, a Level 3 or Level 5 array can reconstruct the contents of any mechanism that fails. With most Level 3 or 5 arrays (RAID Levels 2

EYEING THE ARRAYS

Company	Phone	Toll-Free Phone	Product	List Price *	Macworld Lab	Capacity	Supports Striping
Conley Corporation	212/979-8824	○	SR1-3x3G	$29,995	○	10GB	●
			SR2-5x3G	$44,995	○	15GB	●
FWB	415/474-8055	○	SledgeHammer series	$1259–$12,079	●	240MB–5.6GB	●
Loviél Computer	612/828-6880	800/688-3696	Loviél R1	$9995	○	NA **	●
			Zebra series	$4200–$7535	○	1.2GB–4GB	●
			Larc series	$2199–$3349	○	NA **	●
Mass Microsystems	408/522-1260	800/522-7979	Personal Array series	$5699–$6699	○	1GB–2GB	●
			MassterArray series	$18,999–$39,999	○	2GB–8.2GB	●
Mega Drive Systems	310/247-0006	800/322-4744	MR/RAID series	$17,356–$19,000	○	2.7GB–73.5GB	●
MicroNet Technology	714/581-1540	○	SB series	$4390–$6990	○	1GB–2.4GB	●
			Q9e/e series (Raven 040)	$3790–$14,190	●	1GB–5.5GB	●
			Q8e/e series	$4090–$14,490	○	1GB–5.5GB	●
PLI	510/657-2211	800/288-8754	MiniArray	$2906–$5619	○	480MB–2GB	●
			MiniArray 040 series	$2131–$5231	●	480MB–2GB	●
Procom Technology	714/852-1000	800/800-8600	Nu32 series	$4985–$16,185	○	1GB–5.8GB	●
Storage Dimensions	408/954-0710	○	MacinStor SpeedArray Fast	$4204–$25,204	○	1GB–11.2GB	●
			MacinStor SpeedArray Wide	$13,969–$26,389	○	5.6GB–11.2GB	●
Transoft	805/963-7181	800/949-6463	T-1000	$4995	○	NA **	●
			T-2000	$19,500	○	NA **	●
Unbound	714/863-1100	800/257-0704	RaidStor	$15,800	○	5GB	●

● = yes; ○ = no. * Price ranges indicate numerous arrays with various capacities and mechanism configurations. ** Drive enclosures, controllers, and software only; drive mechanisms

and 4 aren't used in the Macintosh world), you can even replace a downed mechanism without shutting down the system. The drawback of such systems is that the extra overhead required to keep track of each mechanism's contents slows overall performance.

A Level 1 array provides a better balance between performance and reliability using a technique called *mirroring*, which writes the same information to two mechanisms simultaneously. Disk reads from a Level 1 array are about as fast as from a Level 0 array, but writes take longer, since the data must be written twice—once for each disk in the pair. Most SCSI-2 adapter boards include software for setting up a mirroring array. Most arrays can be configured through software as either Level 0 or Level 1.

You can buy an array as a complete package that includes drive mechanisms, driver software, and in some cases, a controller board; or you can assemble an array yourself by combining two or more drive mechanisms with a SCSI-2 board that includes striping or mirroring software.

If you take the former route, note that most arrays for the Macintosh are designed for the Quadra 900 and 950. These Macs provide two electrically separate SCSI buses: one for internal devices and one for external ones. In arrays designed for these Quadras, one drive attaches to the internal SCSI bus and the other to the external one. Such arrays are generally available in three configurations: two external drives, two internal drives, or one of each.

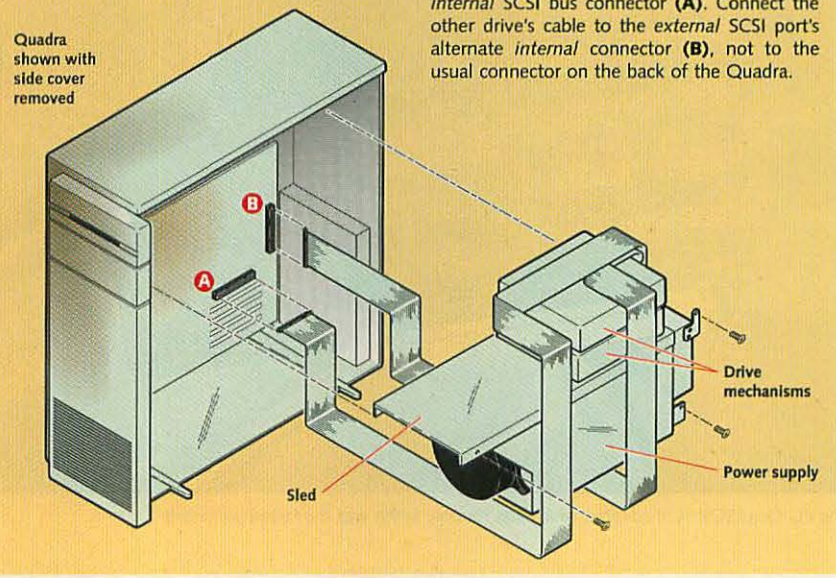
An internal/internal configuration provides the most security against theft and takes up no extra desk space, but requires the most effort to install—you must remove the metal sled that holds internal drives, attach the drive mechanisms to the sled, reseat it, and then connect a couple of fat cables and carefully route them through the case so that its lid will fit. The drive that would normally connect to the external SCSI port attaches to an internal connector on the Quadra's logic board (see "Installing an Internal Array"). Tip: It's easier to attach the cable to this internal-external connector if you remove the Quadra's power supply before beginning.

Last year, numerous arrays had been announced but only one shipped: MicroNet's Raven 040, a Level 0 array designed for the Quadra 700 and 900. The Raven has plenty of company this year. Macworld Lab tested four Level 0 arrays. MicroNet's Raven 040 Q9e/e-2480R (just over 2GB of storage, with Maxtor mechanisms), PLI's MiniArray 040 (2GB, with DEC mechanisms), and the internal/external version of FWB's SledgeHammer2000FMF (2GB, with DEC mechanisms).

The external/external SledgeHammer is an appealing package—both drives and their controller circuitry are enclosed in a single case, making this one of the few arrays that can connect to any Macintosh. (You can also connect the drives to the Quadra's internal and external SCSI buses.)

Installing an Internal Array

A RAID array with two internal drives—which a Quadra 900 or 950 can accommodate—provides the most security against theft and takes up no extra desk space, but requires the greatest effort to install. First remove the power supply and the metal sled that holds internal drives, and attach the drive mechanisms to the sled. Reseat the sled, then connect the two fat SCSI cables and carefully route them through the Quadra case so that its lid fits. The first cable is easy—attach it directly to the Quadra's *internal* SCSI bus connector **(A)**. Connect the other drive's cable to the *external* SCSI port's alternate *internal* connector **(B)**, not to the usual connector on the back of the Quadra.

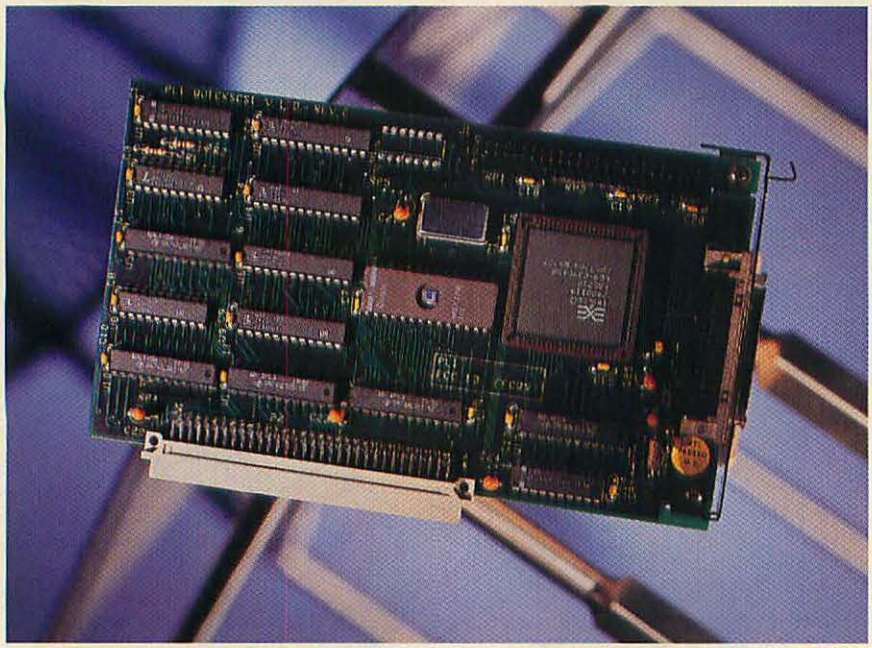


Supports Mirroring (one controller, two drives)	Supports Duplexing (two controllers, two drives)	Maximum Number of Drives Supported	Supports RAID 3/ RAID 5	Warranty Period (in months)
●	●	35	●/●	60
●	●	35	●/●	60
●	○	7	○/○	24
●	○	6	●/●	24
●	●	6	○/●	24–60
●	●	5–42	○/●	60
●	○	2	○/○	24–60
●	○	5 ***	●/●	24–60
●	●	525	●/●	12
○	○	6	○/○	12
○	○	6	○/○	12
○	○	6	○/○	12
●	○	2	○/○	24
●	○	2	○/○	24
●	optional	7	optional/optional	drives 60, controller 12
●	●	7	○/○	24 or 36
●	●	15	○/○	36
●	○	3–5	●/●	12
●	●	3–20	●/●	12
○	●	35	●/●	12

sold separately. *** *Some MassterArray configurations also include a tape-backup drive or spare hard drive.*

Top Performers

SO HOW FAST WERE THE ARRAYS? THE results were surprising. In Macworld



The PLI QuickSCSI SCSI adapter, which lists for only $499, was the fastest we tested.

Lab's real-world tests, the PLI 2GB MiniArray 040 was only slightly faster than the fastest conventional drive tested, Saturae's Edge 1000r, which uses the speedy DEC DSP3105S mechanism. The MicroNet and FWB arrays were actually slower than the Saturae drive. Indeed, MicroNet's conventional 1.2GB drive was faster in some tests than was MicroNet's Raven 040 array, yet both products use identical Maxtor mechanisms.

When Macworld Lab conducted some additional tests with some large Photoshop images, the fog cleared and revealed the reason. With relatively small files, a Level 0 array can be slower than a conventional hard drive, due to the extra overhead required to split the data-stream and route it to two mechanisms. When Photoshop files reach the 20MB ballpark, however, the tables turn and some of the arrays pull ahead. The MicroNet Raven 040 and PLI 2GB MiniArray 040 showed sustained data-transfer rates of about

VITAL STATS ON TESTED DRIVES

Company	Telephone	Toll-Free Phone	Product	Capacity	List Price	Supports SCSI-2 (Fast/Wide)	Rotation Speed (in rpm)
APS	816/483-6100	800/874-1428	APS F1.2	1GB	$1269	●/○	5400
Club Mac	714/768-8130	800/258-2622	ClubMac 1240MX	1GB	$1539	●/○	6300
CMS Enhancements	714/222-6000	○	PD 2100-II	2.1GB	$5359	●/○	5400
Dynatek	416/636-3000	○	HDA1.2	1GB	$3495	●/○	4317
ETC Peripherals	813/884-2863	800/945-1622	1225	1.2GB	$1599	●/○	4500
Focus Enhancements	617/938-8088	800/538-8866	Focus 2.1GB XXL	2.1GB	$2749	●/optional	5400
FWB	415/474-8055	○	Hammer 1000FMFis	1.1GB	$2349	●/○	5400
GCC Technologies	617/275-5800	800/422-7777	UltraDrive 1300X	1.3GB	$3349	●/○	5400
Hard Drives International	602/350-1128	800/377-3000	PowerDrive 1750	1.8GB	$2299	●/○	3600
La Cie	503/520-5000	○ **	Tsunami 1225	1GB	$1609	●/○	4500
Liberty Systems	408/983-1127	○	70 Series 1.2 GB	1.2GB	$2199	●/○	4500
Loviél Computer	612/828-6880	800/688-3696	Loviél 1225	1.2GB	$2499	●/○	4400
MacProducts USA	512/472-8881	800/622-3475	Magic 2.4 GB	2.4GB	$2799	●/○	5400
MacTown	303/442-6767	800/338-4273	Data Stor HK2100/11	2.1GB	$2299	●/○	5400
MacUSA	612/832-5706	800/621-8462	NuDesign 1.2	1GB	$1348	●/○	5400
MacWarehouse	908/905-9279	800/255-6227	PowerUser Pro	1GB	$1599	●/○	5400
Mass Microsystems	408/522-1260	800/522-7979	MassterDrive 2780	2.7GB	$6999	●/○	5400
MicroNet Technology	714/581-1540	○	SS-1240	1.2GB	$3195	●/○	6300
Microtech International	203/468-6223	800/626-4276	Nova XL 2700	2.8GB	$6289	●/○	5400
Mirror Technologies	612/633-4450	800/654-5294	Mirror 1GB External	1GB	$1799	○/○	3600
Optima Technology	714/476-0515	○	MiniPak 1000	1GB	$1995	●/○	5300
Procom Technology	714/852-1000	800/800-8600	MTD 2900	2.9GB	$7595	●/○	5400
Relax Technology	510/471-6112	○	Vista 3.5GB	2.7GB	$3499	●/○	5400
Saturae	617/661-8166	800/373-3063	Edge 1000r	1GB	$1499	●/○	5400
Spin Peripherals	617/965-9882	800/466-1200	Spin Cyclone 1 Gb	1GB	$1899	●/○	5400
Storage Dimensions	408/954-0710	○	MacinStor 2Fast	2.8GB	$6369	●/○	5400
Third Wave Computing	512/832-8282	○	1.2X	1.2GB	$1449	●/○	5400
TMS Peripherals	407/998-9928	800/275-4867	Shadow Compact Portable	1.1GB	$1379	●/○	5400
Total Peripherals	508/393-1777	○	Quantum 1.2GX	1.2GB	$2399	●/○	5400
Tulin Technologies	408/432-9057	○	A-Hive 2100	2.1GB	$2599	●/●	5400

*● = yes; ○ = no. * In addition to any programs listed here, many drives also include a selection of shareware. ** Changes monthly. *** Requires invoice number.*

5MB per second, almost twice the pace of a fast conventional drive (see "When Do Arrays Pay Off?").

The FWB SledgeHammer never did break from the conventional drive pack; it's a solid product for mirroring applications, but in our tests, the competition provided better performance in data-striping configurations.

Arrays show their stuff when a Photoshop file reaches the 20MB ballpark, but you shouldn't necessarily expect to see this effect in 20MB files created by other programs. When opening a file, Photoshop actually transfers five times the amount of data present in the file: Photoshop (like some other image-processing programs) reads the original file, creates a working copy, reads from this working copy, creates an undo file, and then reads the working file once more to create the screen display. Thus, Photoshop actually transfers 100MB when opening a 20MB image. Larger images obviously mean even larger data transfers—and a stronger argument for a Level 0 array.

So unless you work with gargantuan files on a regular basis, don't buy a Level 0 array for its performance benefits—you can probably find the speed you need in a conventional drive.

Looking Ahead

I'VE MENTIONED THAT THE NEXT FEW months should bring new configurations incorporating Seagate's Barracuda drives and other new mechanisms. What about the long-term future? One development on the distant horizon involves *dual channel* drives—mechanisms containing two sets of heads that can read from or write to different parts of the drive's platters simultaneously, reducing the drive's effective seek time—ideal for file-server applications.

A new version that is of the Mac's SCSI Manager, the portion of the Macintosh system software that is responsible for handling SCSI communications, should come to fruition sooner. A new SCSI Manager is in the works that will directly support SCSI-2 Fast devices as well as synchronous data transfers. Its release should make it possible for Quadras to take better advantage of the latest drive mechanisms without requiring a SCSI-2 adapter, and is also likely to streamline the development of SCSI-2 adapters and arrays.

As for today's buying decisions, if your work demands a high-end hard drive—particularly one in the 2GB capacity range—and you can afford to wait until August or September, put off a purchase until the new, faster generation of 2GB mechanisms arrives. To put it another way, if you wait a while now, you'll wait less later. **m**

Contributing editor JIM HEID is the author of the *Macworld Complete Mac Handbook* and *Macworld Guide to Microsoft Word 5*, both published by IDG Books Worldwide (1991 and 1992, respectively).

Macworld Lab testing supervised by TIM WARNER.

Includes Backup Software	Other Included Software *	Warranty Period (In months)	Extended Warranty Available	Technical-Support Rating
●	Alliance Power Tools, DiskFit Direct	60	○	very good
○	none	24	○	very good
●	CMS Utility, Norton Utilities	60	●	not tested
○	Compass Drive Utilities	60	○	very good
○	ETC Tools	power supply 12, mechanism 60	●	very good
○	Diskmaker, Virex, Citadel, and Complete Undelete	power supply 36, mechanism 60	●	excellent
○	Hard Disk Tool Kit	24	●	excellent
○	StuffIt SpaceSaver	24	●	very good
○	Disk Manager Mac	12	●	excellent
○	SilverLining	24	●	excellent
○	FWB Hard Disk Toolkit	12	●	very good
○	Anibus Formatter	60	○	excellent
○	none	60	●	very good
○	○	power supply 12, mechanism 60	○	good
○	Hard Disk Toolkit Personal Edition	60	○	poor
○	○	24	○	not tested ***
○	7th Heaven	60	●	not tested
○	MN Utility	12	●	very good
○	Norton Utilities Shortlist	60	○	excellent
●	7th Heaven	24	●	good
○	DiskMount	12	●	excellent
○	Procom Installation Software	60	●	excellent
○	Diversified I/O	60	○	poor
○	Copyright	60	○	excellent
○	Spin Utilities	60	○	satisfactory
●	Central Point MacTools	24	●	very good
○	FWB Hard Disk Toolkit	60	○	very good
○	TMS DiskWriter	60	●	very good
○	TPI Disk Manager	24	○	good
○	Format/Cache	60	○	good

MW EDITORS' CHOICE

1GB–1.3GB Drives

Edge 1000r This DEC-based machine tied for first with MicroNet's SS-1240, but sells for less and doesn't require a SCSI-2 adapter board. **Company:** Saturae. **List price:** $1499.

MiniPak 1000 A gigabyte to go: this Maxtor-based drive delivers fast performance in a portable package. **Company:** Optima Technology. **List price:** $1995.

2.0GB–2.9GB Drives

Nova XL 2700 Rugged construction, solid performance, and a five-year warranty make this drive a standout. **Company:** Microtech International. **List price:** $6289.

Vista 3.5GB This drive uses the same Seagate Elite-3 mechanism as the other 2.7GB drives tested, but costs much less and includes a five-year warranty. But buyer beware: technical support was poor in our tests, and this was the noisiest drive in our tests. **Company:** Relax Technology. **List price:** $3499.

SCSI-2 Adapter

QuickSCSI This reasonably priced, NuBus-based SCSI-2 adapter for the Quadras provided a bigger performance boost than the competition—as it did last year. Its documentation needs work, however. **Company:** PLI. **List price:** $499.

BY MARJORIE BAER

Choosing a Storage Strategy

What's the best way to expand your storage?

Into the life of every Macintosh user there comes this day: you need more storage. The hard drive that once seemed a vast frontier waiting to be filled is now jammed with files and applications, fonts and system extensions, scanned photographs and page layouts, maybe even a couple of QuickTime movies and stereo sound. A bigger hard drive with, say, a couple hundred more megabytes won't do. You want space, like galactic space—boundless, limitless, extending infinitely.

But it's more than just limitless space you need, it's *portable* space—space that fits in your pocket or briefcase on your way to the service bureau, your client's office, your job, or your home.

If you're only toting a few spreadsheets or text documents around, the humble floppy disk will serve you well. An 800K disk holds a good 750 pages of plain text or a 10,000-cell spreadsheet, fits in a pocket, and is compatible with virtually any Macintosh. But you won't be able to squeeze even one high-resolution scanned photograph onto an 800K floppy disk, and you'd need the patience of a saint and 120 or more of these disks to back up an almost-full 100MB hard drive. And long gone are the days when you could fit the Macintosh System on a floppy. For all of these purposes you need an alternative form of storage.

You're in luck. The Mac supports several alternate-storage technologies, each with rewritable removable-media cartridges or disks that effectively give you limitless storage to take anywhere.

To help you choose the right removable-storage solution—or solutions—*Macworld* looked at the array of available options and evaluated them in terms of speed, device price, price per megabyte of storage, and appropriateness for different work settings.

At the low end of the market ($400 to $600) you'll find Floptical and very-high-density floppy (VHDF) drives. Both drives offer roughly 20MB of storage (remember, that used to be a hard drive's worth) on a single 3.5-inch disk. At the high end of the market, with street prices around $1200 to $6000 but falling, magneto-optical mechanisms provide archival storage on virtually indestructible disks holding up to a gigabyte of data each.

Somewhere in between these two markets, you'll find the original removable-storage kings—the Bernoullis and SyQuests, two institutions that still dominate the market, and for good reason. They've proven their worth as reliable, sturdy, and cost-effective. And finally, removable and external hard drives and tape-backup systems fill out the bill.

If you're looking for simple, clear distinctions—price versus speed versus reliability, for example—be forewarned. The market is in flux, and price and performance differences are narrowing. The right solution depends as much on the

1
2
3
4
5

state of the technology as on the type of files you create and kind of work you do.

You may find—as many companies large and small have—that you need or want several removable-storage devices. Artists and graphics firms, for example, may find it effective to use a removable hard drive for work in progress and a SyQuest drive for transporting files to service bureaus. An accounting firm might keep a stack of digital audiotapes for daily backups but archive client records to a magneto-optical drive. With that said, here's how to get unlimited and portable storage forever.

Bernoullis and SyQuests

UNTIL RECENTLY, WHEN REFERRING TO removable-storage devices, people usually meant SyQuest-based drives, Ricoh-based drives, or Bernoulli cartridge drives from Iomega, the first three removable-media mechanisms out the gate. (Ricoh recently exited this market.)

These highly versatile devices, which today support 44MB to 150MB media, gained rapid widespread popularity almost as soon as they hit the market in the mid-1980s, especially as mountable backup devices for hard drives and as convenient ways to transport large files. Because these drives use magnetic media, files stored on them are vulnerable to stray magnetic fields and to eventual weakening, but their superior speed and wide acceptance among Macintosh users make them an excellent choice where long-term durability is not essential.

Whether you opt for an internal or external drive, you can find a Bernoulli or SyQuest drive for roughly $600 to $1200, list price; street prices start around $400 with SyQuest cartridges ranging from about $65 to about $145, depending on capacity. Bernoullis are a bit more expensive, with prices of $79 for the 35MB disk to $245 for the 150MB.

SyQuest cartridges are available in the 5.25-inch format in either 44MB or 88MB capacity; newer 88MB drives can both read and write to, but not format, 44MB cartridges, although at irritatingly slow speeds, according to Macworld Lab tests. This spring, a 3.5-inch, 110MB mechanism (formatted disks hold 105MB of data) shipped to resellers, who in turn are just now bringing devices to the retail market. Macworld Lab looked at some of these mechanisms to compare them against other storage options (see "Comparing Storage-Media Performance").

The original Bernoulli drives worked with 5.25-inch, 44MB cartridges and were succeeded by 90MB drives that could read but not write to the 44MB cartridges. The MultiDisk 150, introduced last year, works with a new range of cartridges—35MB, 65MB, 105MB, and 150MB—and can both read and write to the 44MB and the 90MB cartridges. The MultiDisk 150 gives consistently good speed on all of the new cartridges but there's a substantial speed deficit when writing to the 90MB and 44MB cartridges. In Macworld Lab's tests, the Bernoulli MultiDisk 150 was somewhat slower than both SyQuest's new 3.5-inch 105MB drive and the 5.25-inch 88MB drive. On average, the Bernoulli MultiDisk 150 took about 23 percent longer than the SyQuest 105MB mechanism and about 22 percent longer than the SyQuest 88MB mechanism to open, copy, and save files.

This fall, SyQuest plans to introduce two high-capacity drives, a 256MB 3.5-inch mechanism and a 5.25-inch mechanism in the 170MB-to-200MB range. Both drives will be outfitted with servo mechanisms that can read from and write to lower-capacity cartridges as well. These high-capacity drives are sure to turn the hair gray on vendors of magneto-optical drives looking to penetrate the SyQuest market.

Bernoulli

Applications
Personal backup; secondary storage; transporting files

Advantages
Fast; widely used; highly portable media; can be used as a start-up drive

Disadvantages
Relatively high cost per megabyte.

Mechanism*

Size	External	Internal
44MB	$1399	$1249
90MB	$949	$799
150MB	$1122	$1099

Media*

Size**	Price	Price/MB	Price/System***
44MB	$155	$3.52	$2954–$3104
90MB	$229	$2.54	$2173–$2323
150MB	$208	$1.39	$1931–$1954

*All prices are based on averaged list prices from several vendors. **35MB, 65MB, and 105MB media, which run on the 150MB mechanism (the MultiDisk 150), also available. ***Cost of the mechanism (drive) and media (5.25" cartridges) needed to store 480MB.

Which One When?

IN THE MACINTOSH WORLD, SYQUEST drives, manufactured by SyQuest but packaged and retailed by an assortment of resellers, hold a sizable dominance over Bernoullis. In the DOS and Windows marketplace, the reverse is true. Service-bureau clients, however, can safely choose either system; all but the smallest service bureaus and prepress houses accommodate both SyQuests and Bernoullis, according to a 1992 survey.

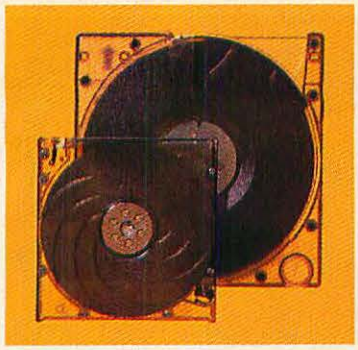
While Bernoulli technology has enjoyed a reputation as being more reliable than SyQuest's, the problems with early SyQuests have been fixed and the technology's reliability is no longer an issue. Unlike the rigid disk inside a SyQuest, a Bernoulli uses a flexible medium, something like that inside a floppy disk. The read-write head floats slightly above the disk on a cushion of air that also whisks away any dust that makes it through the disk's protective case. If the air current ceases (due to a loss of power, for example), the disk falls out of the way of the head, eliminating the threat of head crashes. While out-and-out head crashes are relatively rare in SyQuest drives, the drives are susceptible to dust, which can make individual files unreadable.

Also, the argument goes, as the sole producer of both mechanisms and media, Iomega has been able to maintain a consistent standard throughout its product line. Whatever the capacity of the cartridge, the driver is the same; a Bernoulli is a Bernoulli is a Bernoulli.

Historically, things have been slightly more complicated on the SyQuest side. Because 20 or more vendors produce SyQuest-based drives, each with its own driver software, switching cartridges can be a hassle. But SyQuest is fighting back. Last year SyQuest made available to resellers a new version of the SCSI Probe utility that automatically makes sure the proper driver is always in operation.

Mighty Mo

MO, AS IT'S OFTEN REFERRED TO, HAS plenty to recommend it. Though the initial cost for a magneto-optical system can be up to six times as much as a Bernoulli or Iomega drive, the price gets you access to superlow media costs. Each megabyte



SyQuest

Applications
Personal backup; secondary storage; transporting files

Advantages
Fast; widely used; highly portable media; can be used as a start-up drive

Disadvantages
Relatively high cost per megabyte

Mechanism*

Size	External	Internal
44MB	$749	
88MB	$899	
105MB	$1049	$949

Media*

Size	Format	Price	Price/MB	Price/System**
44MB	5.25"	$101	$2.30	$1860
88MB	5.25"	$151	$1.72	$1805
105MB	3.5"	$168	$1.60	$1789–$1889

**All prices are based on averaged list prices from several vendors. **Cost of the mechanism (drive) and media (3.5" or 5.25" cartridges) needed to store 480MB.*

of MO storage runs you about 29 cents, as compared with $1.65 per megabyte for a typical SyQuest system. For those who need storage in truckloads, paying between $1200 for a 3.5-inch 128MB MO drive and $6000 for a high-end 5.25-inch gigabyte drive is a worthy investment.

If archival durability is your foremost concern, a system based on a magneto-optical drive is your best choice, period. The infrared laser beam in the mechanism's read-write head records information on a layer of medium that is safely sandwiched between two protective layers; even if you manage through exceptional malice or neglect to damage the coating, the focal depth of the laser reading the data is long enough (sometimes over an inch) to access data reliably.

Further, optical cartridges are several hundred times more resistant to magnetic-field corruption than are conventional magnetic media, making for a far longer shelf life, up to 30 years, for optical disks.

Not surprisingly, government agencies and insurance companies use opticals to store scanned-in collections of forms and to archive data on write-protected disks. Artists and graphics houses working with high-resolution scanned photographs use opticals to save multiple versions of images for reuse virtually indefinitely. And many service bureaus maintain optical archives for their clients.

Due to the low cost of media, many users back up to opticals as well. Opticals may be more expensive than tape-backup drives, but like Bernoullis and SyQuests, opticals have two aces in the hole. You can boot up your system from an MO drive, and you can search data backed up to MO far more quickly than you could ever hope to with tape.

In the past, MO drives have been faulted for both their lack of industry-wide standards and their slow speed (compared with hard drives). In response to the former, the optical vendor community is nearing consensus on a whole range of media specifications, affecting everything from track density and disk height to the size of the spindle hole.

As for overall speed, in Macworld Lab's tests the 3.5-inch optical drives performed about 92 percent more slowly than SyQuests and 59 percent more slowly than Bernoullis. However, 5.25-inch opticals compare very favorably with SyQuests and slightly outperform Bernoullis.

But don't make a buying decision based on speed tests. While superfast access times are critical for a primary storage device, like a hard drive, they're not imperative for devices used for secondary storage. Few users run applications from MOs. Instead, most MOs are used as backup devices or as secondary storage for large files and images.

Meanwhile, prices for the MO's laser mechanism—the heart and soul of the device—have nearly halved since introduction. What's more, a new, split-head design for the read head, available in a few models, dramatically reduces the weight of the traveling portion of the head, enabling far greater access speeds. Even so, data-transfer rates are still about twice that of hard drives because, although the head can find data faster, the data itself goes through the logic board at the same rate once it's been found.

For users with astronomical storage needs, optical-drive makers have developed a mechanism known as the optical jukebox. Like its audio forebear, the optical jukebox holds multiple disks and places them into operation one at a time at the user's bidding. For example, the PMO 10GB from Pinnacle Micro (714/727-3300) holds 16 5.25-inch 650MB cartridges, and will set you back $9995 for the jukebox, assorted cables, software, and a set of 16 disks. That's a lot of random access, even if you do have to wait while the jukebox changes disks.

Floppies on Steroids

IF YOUR BACKUP AND ARCHIVING REquirements are modest, and you are not too concerned about transporting files from Mac to Mac to Mac, two direct descendants of the venerable floppy drive can offer you a convenient and economical option. Around $500 to $600 (street prices start at around $400), Floptical drives and VHDF drives let you cram about 20MB of data onto one 3.5-inch disk that looks—

Magneto-Optical

Applications
Personal backup; network backup; secondary storage; transporting files

Advantages
High data integrity; high-capacity media; economical for very large files and large numbers of files; highly portable media; can be used as a start-up drive; easy access to extremely large data collections via optical jukebox

Disadvantages
High cost; relatively slow

Mechanism*

Size	External
128MB	$1720
650MB	$4100
1GB	$5040

Media*

Size	Format	Price	Price/MB	Price/System**
128MB	3.5"	$68	$0.53	$1992
650MB	5.25"	$186	$0.29	$4286
1GB	5.25"	$291	$0.29	$5331

**All prices are based on averaged list prices from several vendors. **Cost of the mechanism (drive) and media (3.5" or 5.25" disks) needed to store 480MB.*

and performs—like its ancestors.

Of the two technologies, Flopticals have the clear edge. Drives such as the EchoDrive from Second Wave (512/343-9661) and the Floptical from Iomega (801/778-1000) are backward-compatible, so they can read and write to 1.44MB disks. VHDF drives, manufactured by Brier Technologies and available on the Mac only as the QuadFlextra from Quadram (404/923-6666), cannot read or write to regular floppies.

Both types of disk go for about $25 a pop, street price—comparable to the price per megabyte of Bernoulli and SyQuest cartridges. If you work with a small number of files, the 20MB ceiling might not trouble you. An inability to share files with other Macintosh users might, however; these drives have yet to penetrate deeply into the Mac market, which rules them out for sneaker net.

In Macworld Lab's speed tests, the Floptical drives trailed the other removable media by a long shot, roughly taking twice as long as the 3.5-inch optical drives and about four times as long as the 88MB SyQuests. However, Floptical speeds are respectable in comparison to the speed of a standard floppy disk. Both Floptical units tested performed overall about 57 percent faster than the Mac IIci's internal SuperDrive. (The QuadFlextra has compatibility problems with the Mac. Macworld Lab has on several occasions attempted to test the device but has been unable to format the disks using supplied software.)

A few years back, these two superfloppy technologies might have turned some heads, maybe as a replacement for one of the Mac's internal floppies, but for most people today, they offer too little too late. On the other hand, if you work mainly with small files, you may find super floppies an excellent low-cost and practical choice. According to the Floptical Technology Association, a 40MB capacity Floptical drive should come to market sometime next year. While Floptical developers are tight-lipped about projects under way, several avenues exist for improving capacity and speed—increasing linear bit density, increasing track density, and improving rotational speed.

Floptical

Applications
Personal backup; secondary storage; transporting files

Advantages
Low initial cost; highly portable media

Disadvantages
Limited to files <21MB; economical only in low-demand situations; slow performance

Mechanism*

Size	External
21MB	$500

Media*

Size	Price	Price/MB	Price/System** (480MB)
21MB	$31.88	$1.52	$1265.12

*All prices are based on averaged list prices from several vendors. **Cost of the mechanism (drive) and media (3.5" disks) needed to store 480MB.

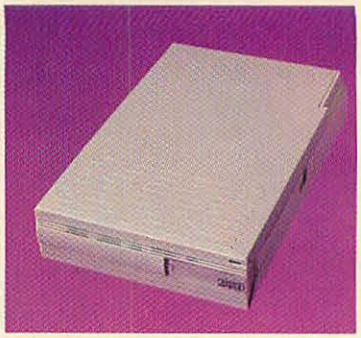
The Old Standby: Hard Drives

BEFORE SUCCUMBING TO THE SIREN song of the new storage technologies, don't overlook the obvious: for all the hoopla over alternate-storage technology, the only storage medium that offers the performance of a hard drive is a hard drive. Removable hard drives and portable hard drives make it easy to carry away hundreds of megabytes, whether you're taking your work on the road or securing it in a locked cabinet.

So if your hard drive runneth over but it's not a chronic situation, the solution may be simply to purchase an additional portable or removable hard drive. For example, a $500 investment in a portable drive can easily net you 100MB or so of fast, flexible, reliable storage, and the dollar-to-megabyte ratio drops quickly as you reach the higher-capacity ranges.

Given adequate space on the second drive, you can devote separate partitions to seldom-used applications, password-protected data, and routine backups.

On the other hand, portable drives are not infinitely extensible. They come in a variety of capacities from the 80MB Mass Microsystems HitchHiker, which lists for $759, to the 210MB Liberty Systems (408/983-1127) Liberty 50240Q, which lists for $749. But once you fill a portable drive, that's it. Just as with any hard drive, you have to clear files off the disk to make room for new ones.



Removable Hard Drive

Applications
Personal backup; network backup; secondary storage; transporting files

Advantages
Fast; can be used as a start-up drive; good for securing sensitive data

Disadvantages
Requires chassis; high cost for drive media

Mechanism*

$399

Media*

Size	Price	Price/MB	Price/System**
50MB	$349	$6.98	$3889
100MB	$419	$4.19	$2494
120MB	$469	$3.91	$2275
240MB	$819	$3.41	$2037

*All prices are based on averaged list prices from several vendors. **Cost of the mechanism (chassis) and media (drive cartridges) needed to store 480MB.

Removable drives, which pop in and out of stationary docking stations, or chassis, operate very much like portable hard drives, with one added bonus: you can extend their capacity by purchasing additional storage units. La Cie's (503/520-9000) Passport Removable Hard Drive, for example, begins with a chassis that goes for about $400 into which you can plug storage units from 50MB ($349 list) to 240MB ($819 list).

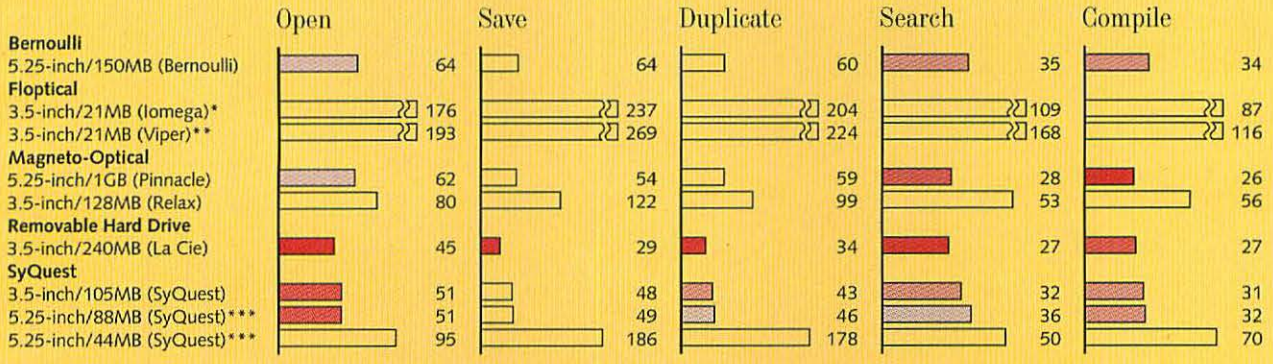
A high price, yes, but if you have a chassis at home and one at work, a removable hard drive can be a convenient choice—with its protective carrying case it's slightly smaller than a portable drive and you don't need to connect the SCSI cable each time you use it. Nevertheless, expect to see these relatively rare devices become even rarer as removable-cartridge systems and MOs dominate the market.

MW LAB Comparing Storage-Media Performance

Times are in seconds. Shorter bars are better.

Color Key
Fastest
Percent slower than fastest
Up to 10%
11%–20%
21%–30%
31% or more

How do different types of removable storage compare? To find out, Macworld Lab tested the relative performance of representative devices in five categories. With each device, we opened and saved a 3.9MB Photoshop file and a 2.6MB PageMaker file, duplicated a 10MB folder and a 3.2MB 4th Dimension database file, and conducted a search and then a compile on a 3.2MB 4D database. After the removable hard drive, which turned in the fastest speeds overall, the new 3.5-inch SyQuest was consistently the speediest device, followed closely by the 5.25-inch, 88MB SyQuest. Interestingly, the 5.25-inch magneto-optical drive edged out the 5.25-inch Bernoulli in all tests and bested even the removable hard drive in the compile test.



*Uses laser holographic optical tracking. **Uses laser optical tracking. ***Tested on a SyQuest 88 RW 44 (which reads and writes 44MB and 88MB cartridges).

Tape Drives

FINALLY, SOME OLD NEWS: IF IT'S BACK-up storage you seek—and just backup—magnetic tape drives are still by far the cheapest way to go. You can set up your backup system to operate automatically and then virtually forget about it until you need to restore.

Individual users and others with reasonably modest storage needs can pick up a good-quality drive such as the APS Teac 155, with backup software, for under $500 (APS Technologies, 816/478-8300). With 150MB tape cartridges going for roughly $20 each, that's about 13 cents per megabyte of data.

Companies looking for network backup and those working with very large files can find gigabyte-plus drives using either helical-scan (8mm) or digital-audiotape (DAT) technology. The drives themselves range widely in price, from around $1300 to several thousand for a 5GB 8mm tape drive from companies like MacinStor or Storage Dimensions, but high-capacity tape cartridges bring the DAT's media price down below a penny per megabyte.

Although cheap and reliable, tapes are not sufficiently stable to provide long-term archiving. For routine backup you can confidently reuse cartridges many times. After a while, though, tapes stretch and wear out, just as audiotapes do, but with potentially disastrous effect. That's why many users maintain a stash of tape cartridges and cycle through them for weeks or months, replacing them periodically with fresh tapes.

Even if you use tapes only once and then put them away, the magnetic charge weakens with time. Files stored on magnetic tape—as on any magnetic medium—can become corrupted and unrecoverable after a couple of years.

The great advantage to tape is its low price. Its great disadvantage, and the one that sets it apart from all the other storage media discussed here, is that data access is sequential and not random. That means to restore data saved to tape, you've first got to find it by rolling forward or backward on the tape.

New software, such as Optima Technology's (714/476-0515) DeskTape, can index tape contents and place a directory folder on the desktop. With these applications, selectively restoring files and folders becomes a familiar—if still painfully slow—copy operation. (For more on tape drives as a backup medium, see "Tape Backup Bounty," *Macworld*, December 1992.)

Which Storage Universe?

ALL REMOVABLE SYSTEMS PROVIDE VIRtually limitless storage. The question, then, is which standard is best for you.

If your main concerns are compatibility, versatility, device price, and speed, then the most flexible all-around choice remains, at least for now, SyQuest drives. With performance just slightly behind that of a hard drive, and with widespread use among Macintosh users, 88MB SyQuests make good sense for people who routinely carry large files around.

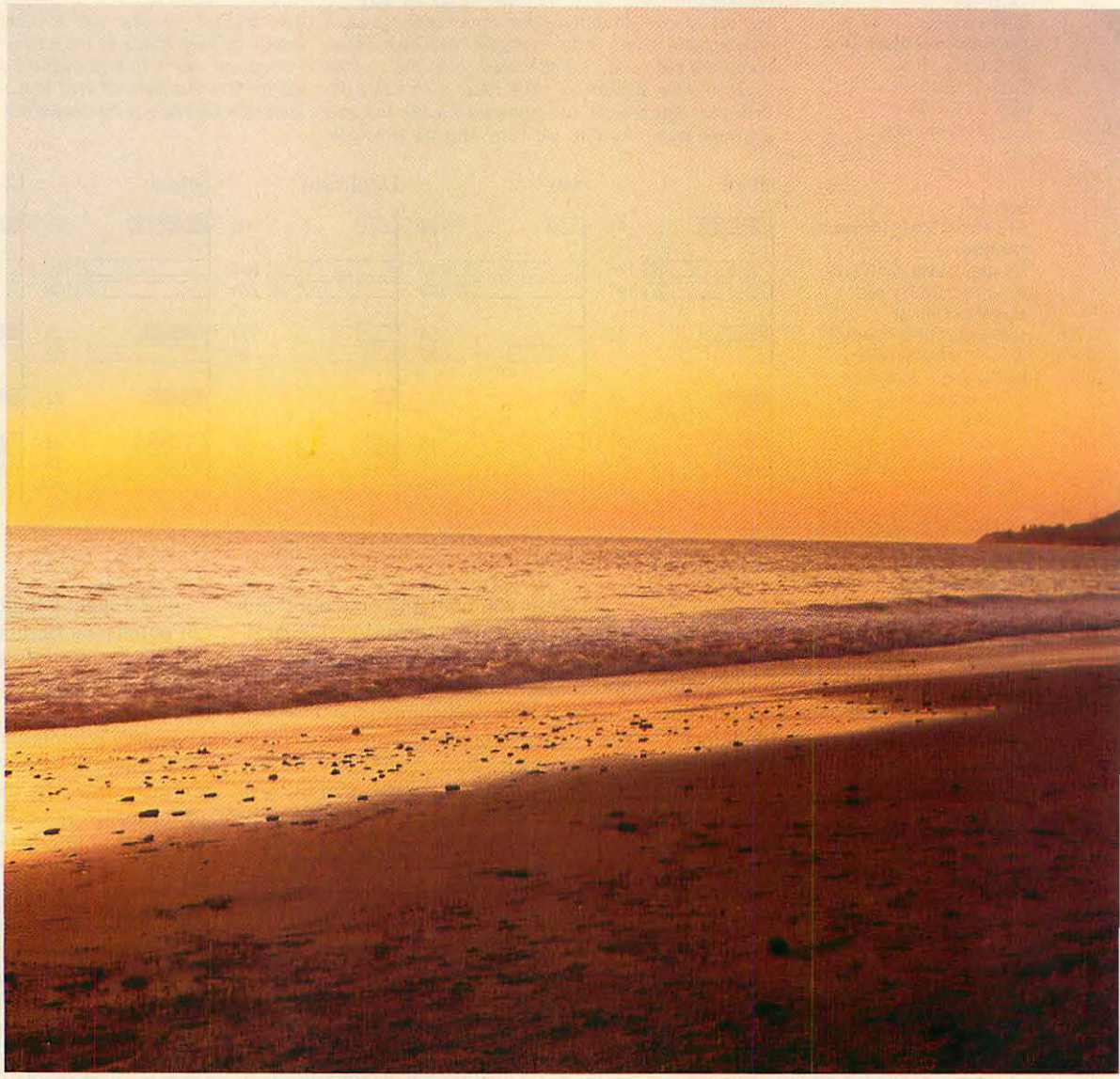
For a slightly higher investment, you can purchase a Bernoulli MultiDisk 150 and get the same flexibility and a little sturdier cartridge for your data. Either type of drive makes for a convenient, if not necessarily economical, backup device.

If you're more concerned about long-term data integrity or random access to gigabytes' worth of data, make the move to magneto-optical. Though the technology is still maturing, it's plenty stable, and the low media cost is surpassed only by tape. The optical industry is sure to respond in kind to SyQuest's aggressive competition, which means prices will continue to fall as performance rises.

If cost is an issue, here is the rule of thumb. If you work with small files or a modest number of files, the cost of the device is more important than the cost of the media. If you routinely work with color, video, scanned images, and other break-the-bank file sizes, you will save money in the long run by buying a device that offers low media cost, even if it means a higher investment in the device itself.

It's always tempting to hold out until the next unit ships—to wait for the high-capacity SyQuests or the next faster optical. Yes, whatever you buy today will be supplanted tomorrow by something better. But if your hard drive is bulging at the seams, there's no way to avoid it; take the plunge—and start saving up for your next purchase. **m**

Macworld Lab testing supervised by MATTHEW CLARK.



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Reviews

IN THIS ISSUE: **LaserWriter Select 300 and 310, ClarisWorks 2.0, StuffIt Deluxe 3.0 with SpaceSaver, Phaser 200i Color Printer, Project Scheduler 5, Apple Color Printer, and more**

Macintosh Computer

Macintosh Quadra 800

PROS: Powerful; moderately priced; CD-ROM and multiple hard drives can be installed within commodious drive bay; memory interleaving provides for speedier performance; new, ergonomic Mouse II. **CONS:** Installing RAM requires removal of system board; requires pricey 60ns 72-pin SIMMs; on-board video limited to 8-bit screen depth on 19-inch and larger monitors with maximum 1MB video RAM installed. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** With 8MB of RAM and 230MB hard drive $4679.

MW ★★★★

ROBERT PENNY

I GOT MY FIRST MAC IN 1989, IN THE early summer. It was a IIcx, and it set me back nearly five grand. I also learned that keeping up with the latest and greatest in the computer world is an exercise in futility (and not terribly cost-effective). A few weeks later, Apple introduced the IIci, which quickly took the mantle of latest and greatest.

The Quadra 800 will undoubtedly be supplanted by faster and better Mac CPUs. But right now, the tests at Macworld Lab say it all. Although the 800 breaks no new ground, Apple has managed to simplify the circuit board, and the result is a computer that surpasses the Quadra 950 by 5 to 10 percent in our standard suite of benchmark tests (see "Quadra 800 Performance"). And the whole package has a street price of hundreds less than I paid for that vastly less powerful computer just four years ago.

Squat, yet curvy and attractive, the Quadra 800 is a true minitower. When you open its cover with the four large rear-mounted screws, you'll find just one modestly sized circuit board. Apple has done its homework. By directly connecting the Quadra 800's video subsystem to the 68040 processor bus, Apple gets speedier performance. More efficient design has reduced the number of application-specific integrated circuits from ten to three, providing better speed at reduced cost.

To extract that last iota of performance, Apple has introduced something that Macintosh users have already seen on the Radius Rocket 68040 accelerator board. It's called memory interleaving, and it allows the CPU to address two SIMMs of the same size and speed as one, resulting in faster burst-transfers of data. The Quadra 800 also uses a type of SIMM previously found on some high-end PCs. These SIMMs have 72 pins, and each SIMM addresses a full 32 bits, meaning that you need to install just one chip rather than the previously requisite four. To take advantage of interleaving, you must buy a matched set; the 8MB of RAM soldered onto the system board is set up as two interleaved banks of 4MB each. Since the 72-pin SIMMs are apt to be in short supply for a while, and you need the 60ns variety for the Quadra 800, expect to pay a healthy price, at least for now. The chips are available in configurations of 4MB, 8MB, and 16MB, with 32MB on the near horizon. All told, you can install up to 136MB of RAM on a fully configured 800 once the largest chips are available. Composite SIMMs, which use many lower-capacity chips to provide the same amount of RAM as a standard SIMM, are not recommended for use with the Quadra 800, as they may work at speeds slower than their published rate.

In addition to the floppy drive, there's a 5¼-inch drive bay for a CD-ROM or removable hard drive, such as a Bernoulli or SyQuest. In one of its optional configurations, the 800 comes with a CD-ROM mounted in the slot. There are also two 3½-inch bays for hard drives.

The three NuBus slots are mounted sideways, with a plastic bracket to hold the boards in place. At the very bottom of the NuBus array is a Processor Direct Slot, for installation of a cache card or other expansion board. Using the PDS slot effectively disables one NuBus slot, but few will miss this NuBus slot because, like all Quadras, the 800 comes with Ethernet and speedy built-in video.

The standard 800's on-board video contains 512K of video RAM, enough for 8-bit video for a 16-inch or 17-inch monitor and 4-bit video for 19-inch and larger screens. The 800 suffers in comparison with the Quadra 950 here. To keep the 800's cost down, Apple limits you to a maximum of 1MB of VRAM, which gives you 16-bit color for a 16-inch or 17-inch monitor, and 8-bit for the larger models. While most users will find this satisfactory, if you need a large monitor for 16-bit or 24-bit color work, you have to seek out a third-party video board.

While installing an additional NuBus board is no more difficult on the 800 than on any other modular Mac, people who are used to popping SIMMs in and out of the slots on their Mac II's will be put off by the procedure for the 800. In order to install RAM, you have to remove a plastic bracket at the right-hand side of the chassis, to free the system board. Then you must slide the programmer's switch assembly out of the front panel and disconnect four plugs. While the whole process takes only a few minutes, it is probably best done by a dealer. Apple gives a stern warning in the manual that the product warranty does not cover damage caused by improperly installed RAM when the job is done by anyone other than an authorized Apple dealer.

Other than the difficult RAM installation, setting up the Quadra 800 is just like setting up other Macs. It comes out of the box ready to hook up to your monitor and other peripherals. The hard drive is preformatted with System 7.1 and includes the now-standard HyperCard Player and Macintosh Basics applications.

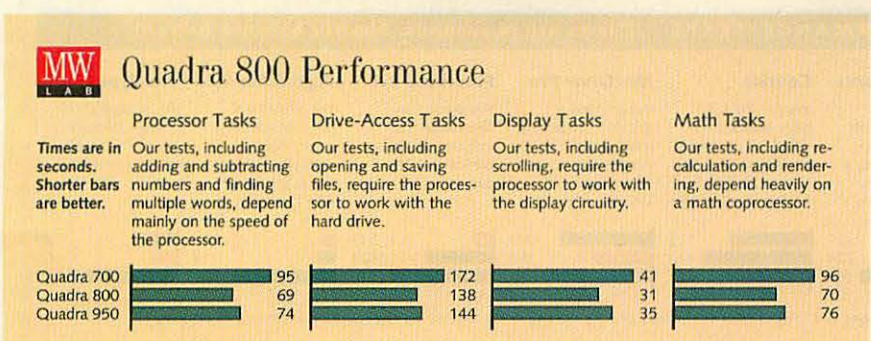
Once under way, you'll see the 800's speedy performance in virtually every function, from scrolling through a document to pulling down the menu bar, to doing a complex 3-D rendering or spreadsheet calculation. The benchmarks don't prepare you for the sheer speed of day-to-day operation. Even the basic 230MB drive (the familiar Quantum 240) is a sprinter, with read-write capabilities of 2MB per second and more (based on tests with FWB Bench Test and La Cie's Time Drive). Applications launch faster; large documents are saved often almost instantaneously; and in publishing programs that can take advantage of the 800's incredible speed, such as QuarkXPress, it can be nearly as fast to enter text as it would be in a word processor (up to now such entry has been a slow chore).

In day-to-day work, I found the 800 a joy to run. I didn't locate any new software incompatibilities or quirks in the new hardware. All of the software that I was able to use on previous Quadra models and on Macs equipped with 68040 accelerator boards ran perfectly on the 800. There were no significant problems—except for some older software that won't work on any Quadra model that has its cache enabled. If you need to use some of this older software, you can disable the 68040's cache mode (using the Cache Switch Control panel), which gives you stability but reduces performance to roughly the level of a Mac IIci.

Apple also deserves praise for its new ergonomic Mouse II, which is sculptured to fit into an average-size hand, and has a large, easy-to-click button at the top. Although I have often gone back and forth between the older-style Apple mouse and trackballs, I am very pleased with the Mouse II. Apple is selling it separately at $79, if you want to upgrade.

Unless you need its greater expansion capabilities (five NuBus slots, maximum RAM of 256MB, and other extras), the Quadra 950 is no longer the high-end Mac of choice. For now at least, that position has been filled by the Quadra 800.

It comes down to this: Would I buy a Quadra 800? Well, I would and I did. And that's the best recommendation I can offer.—GENE STEINBERG



Laser Printers

LaserWriter Select 300

PROS: Inexpensive; expandable; networkable; background printing; excellent gray-scale image quality (GrayShare and PhotoGrade); text and line-art edge-smoothing (FinePrint); high paper capacity. **CONS:** Slow; large; no adjustable paper guides; lacks preview mode; not Communications Toolbox–compatible. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** $839.

MW ★★★★

LaserWriter Select 310

PROS: True Adobe PostScript; expandable; serial and parallel ports; high paper capacity. **CONS:** Very slow; not networkable; no port-switching; large; no adjustable paper guides; lacks preview mode; not Communications Toolbox–compatible. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** $1099.

MW ★★

APPLE HAS REPLACED ITS LOW-END LaserWriter LS with the LaserWriter Select 300 and 310, two inexpensive laser printers with a host of new features designed to appeal to discriminating home users on a budget. While they look remarkably alike, these two printers are worlds apart. Surprisingly, the better of the two is the cheaper one.

LaserWriter Select 300

THE LASERWRITER SELECT 300 IS A "dumb" QuickDraw-based printer with a Fuji Xerox P0 engine rated at 5 pages per minute. I say dumb because Apple kept costs down by leaving out brains, instead relying on the host Mac for rasterizing. Therefore, print speed varies depending on the document complexity and the power of your Mac. In Macworld Lab's standard suite of test pages, the Select 300 ran neck and neck with the LaserWriter LS (see "Select Performance"). The Select 300 comes with 512K of memory soldered on the board, and it has a standard 30-pin socket that can accept 1MB SIMMs (for complex pages) or 4MB SIMMs (for PhotoGrade).

As the Mac processes each page, an animated dialog box displays the percentage of imaging completed, but due to the slow printing, an estimate of time elapsed and remaining would be much more helpful. Fortunately, Apple provides the option of background printing with PrintMonitor, so after a few seconds of

continues

spooling you can get back to work while the printer slowly generates hard copy.

You can share this serial printer on a network using Apple's new GrayShare software. After selecting the Select 300 in the Chooser, click on Setup to name the printer and give it a password to restrict access, if you wish. A log option tracks all the print jobs the Select 300 handles. Since it's no speed demon, the Select 300 is appropriate for sharing among small workgroups only.

What the Select 300 lacks in speed it makes up for with improved image quality. Thanks to GrayShare, the standard Select 300 prints up to 33 levels of gray, comparable to PostScript output. For even better images, add a 4MB SIMM to take advantage of PhotoGrade, an option that allows this 300-dpi printer to generate 91 shades of gray—equivalent to standard 1000-dpi printers, according to Apple. I don't know about that, but the PhotoGrade print quality is amazing for a printer of this price. Halftone dots that normally can be detected with the naked eye melt into smooth shades of gray. Printing a full-page, 8-bit color image using PhotoGrade takes almost twice as long as with standard gray-scale mode, but the results justify the wait.

Both GrayShare and PhotoGrade are compatible with Apple's FinePrint edge-smoothing technology, which virtually eliminates jaggies on line art and text. You can't turn FinePrint off, but that's OK because it really does improve print quality. In fact, thanks to FinePrint, the LaserWriter Select 300 (which comes with 39 TrueType fonts) prints text better than the Select 310 does.

LaserWriter Select 310

THE LASERWRITER SELECT 310 LOOKS just like the Select 300 on the outside; inside, the 310 has a logic board featuring Level 1 Adobe PostScript with 13 fonts (Apple offers a $349 upgrade from the Select 300).

The Select 310 is powered by an Advanced Micro Devices AM29205 RISC processor. The printer comes standard with 1.5MB of memory. Adding a 4MB SIMM didn't increase print speed, but it did enable us to print our TrueType document, which refused to print with less memory unless we selected Unlimited Downloadable Fonts in the LaserWriter Options dialog box.

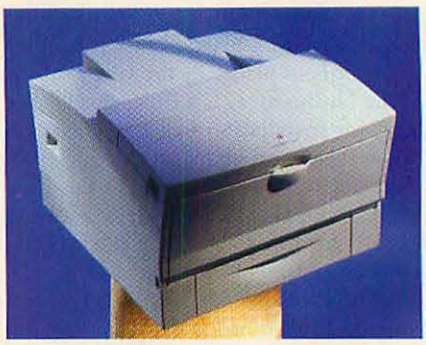
In our tests, on average even a fully loaded Select 310 was only half as fast as a LaserWriter LS. The primary downfall of the Select 310 was the PageMaker document. It took almost 86 minutes to print, versus just 4.7 minutes for the LaserWriter LS and Select 300. At Apple's suggestion, we held down the option key to bypass the Aldus driver, and this cut the print time to about 28 minutes. Better, but still unacceptably slow.

The Select 310 has serial and parallel ports and can be connected to a single Mac (GrayShare is not an option) or a PC running Microsoft Windows (driver and manual provided in the box). Unlike other mixed-environment printers such as the Hewlett-Packard LaserJet 4ML, the Select 310 can't switch ports on the fly. If you've been printing from a Mac, you must turn the printer off and then on before you can begin printing from a PC. Hardly convenient.

Common Ground

THE SELECTS ARE SURPRISINGLY BIG FOR printers designed for home use, where space is often at a premium. They weigh 26 pounds and measure 15.5 inches wide, 18.25 inches deep, and 10.25 inches tall (with the standard paper tray).

The paper tray holds 250 sheets and fits entirely underneath the printer. Additional trays with 250- and 500-sheet capacities are available as options; they attach to the existing tray. Using the Print dialog box, you can select which tray to use for first and subsequent pages. A manual-feed paper tray flips down on the front of the printer for small jobs requiring personal attention. Unfortunately, there are no self-centering guides to help feed pieces smaller than 8.5 inches wide. As a result, manually fed envelopes are often slightly skewed. A 30-envelope cassette is available for $89.



RICHARD RETHEMEYER

The Apple LaserWriter Select 310

Neither printer driver has a preview mode, a big inconvenience and paper-waster. Also, neither is compatible with Apple's Communications Toolbox, which lets applications access more than the standard two serial ports on the Mac using third-party devices such as Applied Engineering's QuadraLink board or the Axion Switch. As such, the printers need to be connected to either the modem port or the printer port. If you share the Select 300, the printer port is already used by AppleTalk, so you must connect to the modem port. Too bad if you wanted to use that for something else.

Individuals or small workgroups looking for an inexpensive, low-capacity printer to share on a network will find that the LaserWriter Select 300 is an excellent buy despite its few weaknesses. But I wouldn't think of buying one without immediately adding a 4MB SIMM to take advantage of the amazing PhotoGrade capabilities. Budget-conscious users who must have PostScript might be tempted by the Select 310 at first glance, but a more thorough examination reveals too many negatives to overlook.—OWEN W. LINZMAYER

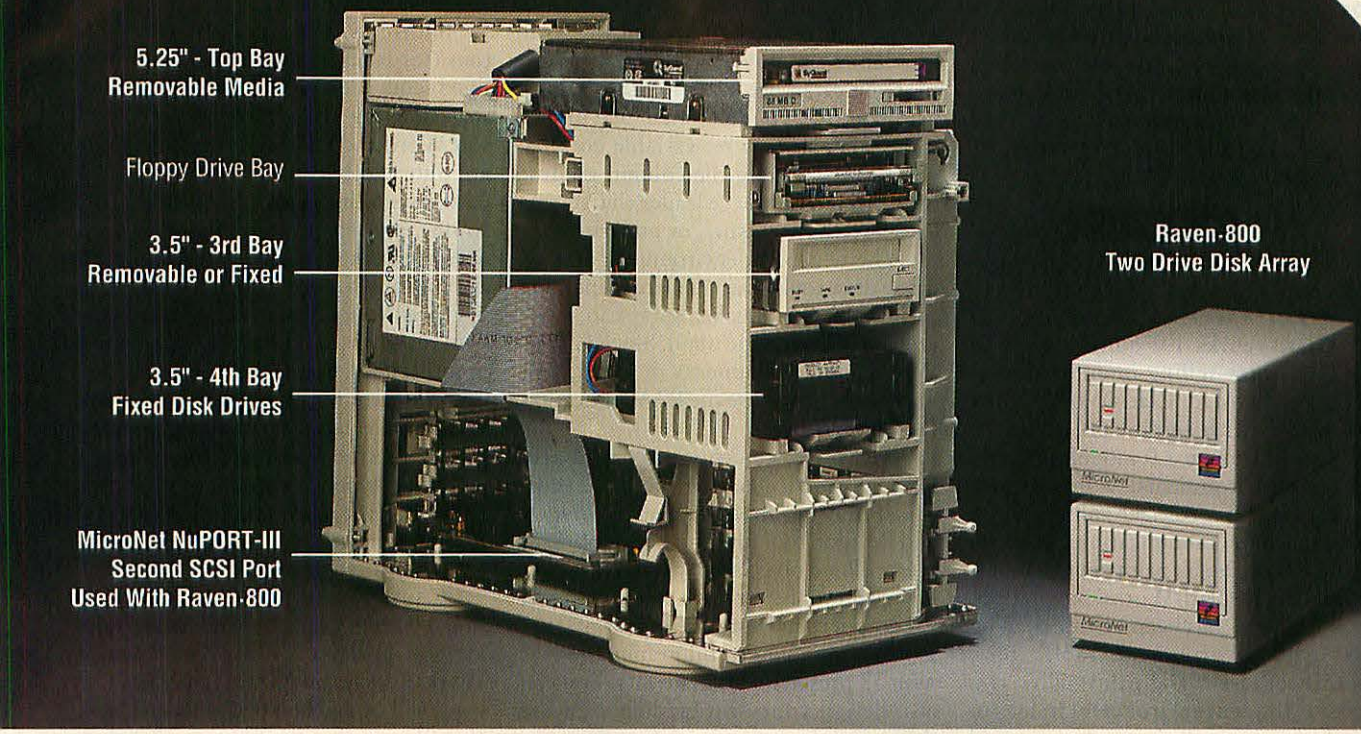
MW LAB Select Performance

	OVERALL	PERFORMANCE TESTS (Times are in seconds. Shorter bars are better.)					
		Multiple Fonts	Courier	MacDraw Pro	FreeHand 3.1	PageMaker 4.2a	TrueType
Red indicates fastest result in test.	These numbers show, as an indexed value, the overall ranking of all the tests to the right.	We printed a 7-page Microsoft Word 5.0 document containing a variety of fonts, sizes, and styles.	We printed a 20-page Microsoft Word 5.0 document containing 12-point Courier text in plain, bold, and italic styles.	We printed a graphic containing more than 2000 simple objects and several lines of Helvetica text.	We printed an illustration that includes nonlinear blends and Bézier curves.	We printed a 4-page newsletter with several fonts, a MacPaint image, and 3 gray-scale TIFF images.	We printed a 1-page Microsoft Word 5.0 document containing 4 fonts.
Personal LaserWriter LS	1.00	221	315	289	317	247	89
LaserWriter Select 300	0.92	224	420	186	1023	313	55
LaserWriter Select 310	0.54	362	267	339	1516	1671*	205

*Time it took with option key held down to bypass Aldus driver. With PageMaker 4.2 instead of 4.2a, we were able to obtain a test result of less than 384 seconds.

Disk Array Power!

Upgrade Existing Apple 500 or 1000 MB Drive to a Raven·800 Disk Array



MicroNet's Raven·800. Disk Array Power For The Quadra 800.

MicroNet is the first to bring disk array power to the Quadra 800. With a matched pair of fast spindle drives, the Raven·800 delivers up to 9.2 MB/second sustained transfers with access time as fast as 4 ms.

Disk arrays can improve performance up to 400 percent over standard drives. Combine MicroNet's Raven·800 disk array with the speed of the Quadra 800 and you have an unbeatable system for applications such as PhotoShop, fileservers, and full rate digital video and audio recording.

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Cost effective two drive disk arrays are available in capacities of 1030 to 5560 MBytes and are expandable to more than 38 GBytes. MicroNet also offers single disk drive systems that can be upgraded to a Raven·800 disk array at a later date.

Built on award winning technology, the Raven·800 takes full advantage of Apple's existing hardware. One drive connects to the native SCSI port of the Quadra, and one connects to a MicroNet NuPORT-III, SCSI-2 host adapter. Together, these two drives create a fast, parallel, 16-bit data path.

MicroNet has designed a complete family of internal storage systems for the Quadra 800. Included are SyQuest removable systems, rewritable optical drives, and DAT backup systems. All are shipped complete with custom designed bezels.

To put high performance disk array power in your Quadra 800, call MicroNet's Sales Department for configuration assistance or the name of your nearest Reseller. 1-714-581-1540.

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Circle 139 on reader service card

Integrated Software

ClarisWorks 2.0

PROS: Improved word processor; new paint module; improved macro features. **CONS:** Conversion of version 1.0 documents needs to be improved. **COMPANY:** Claris Corporation (408/727-8227). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.5. **LIST PRICE:** $299.

MW ★★★★

AFTER ITS RELEASE TWO YEARS AGO, ClarisWorks 1.0 quickly became one of the best-selling integrated programs for the Mac. ClarisWorks 2.0 is even better, with significant improvements to all version 1.0 modules (Claris calls them environments): word processing, drawing, spreadsheet and charting, database, and communications. New to version 2.0 is a 24-bit paint environment.

The key to ClarisWorks' integration, the tool palette, has been expanded. The four main environment tools (text, spreadsheet, draw, and paint) allow you to create different environment frames in a single document; for example, in a word processing document, you can create a spreadsheet frame to add a table, or a draw frame to include a graphic. When you create a frame from a different environment, the menus change to reflect the new environment.

ClarisWorks 2.0 has added to its word processor an outlining mode for organizing documents and ideas. The outliner is easy to use and supports several standard outline formats, including Harvard, legal, bullets, diamond, checklist, and numeric. You can even design your own outline format, though you're limited to just one custom format. You can expand, collapse, and move outline topics with either the mouse or the keyboard.

Useful as the outliner is, it needs a few improvements. There's no Expand All command, and you cannot mix an outline with regular text in the same document. I found a bug using the keyboard command for expanding and collapsing a topic. The expand command doesn't toggle between the expand and collapse states; if you collapse a topic using the keyboard command, then try to expand it using the keyboard, nothing happens. To expand the topic, you have to move the cursor out of the topic and move it back to the topic for the keyboard command to work correctly.

The word processor has several other new features. Text can now flow around graphic objects; you can have the text wrap in a rectangle around the object, or flow around an irregular object. The spelling checker now allows you to check a selection, instead of the entire document. Invisible characters, such as tabs, spaces, and returns, can be shown. You can define and name custom text styles, so if you often use 48-point Zapf Dingbats in purple, you can format text in one step. You can now set variable column widths by dragging the column guides. And tabs can now have leader characters, such as periods, dashes, or underlines.

The new paint environment uses all of the draw tools, plus standard paint tools such as the paint bucket, spray can, eraser, pencil, and magic wand. Since ClarisWorks holds documents in RAM, you may need to increase the RAM allocation for ClarisWorks.

The other environments have also been improved. The tool palette has additional drawing tools, such as a polygon and Bezigon tool (the latter allows you to create closed objects using Bézier curves); new paint tools, such as a paintbrush and eyedropper; and a new gradient palette, which allows you to fill graphic objects with 32 preset 24-bit gradients. You can also design your own gradients. In the draw module, you can set a master page (good for reusing layouts for newsletters) and link text frames. Text can now flow from one linked frame to the next. You can also link spreadsheet and chart frames. Changing the spreadsheet data automatically changes the linked chart. Text now wraps in spreadsheet cells, and more chart types are available. Creating layouts for mailing labels is much easier, thanks to a new pop-up list with more than 50 Avery-label formats. Database data entry is also easier, thanks to the pop-up lists of user-defined default values for fields. In the communications environment, Claris has added the Kermit file-transfer protocol (but still no Zmodem protocol) and a phone book for frequently called numbers. A new presentation feature is the Slide Show mode, which turns ClarisWorks pages into slides that can fill the screen, include QuickTime movies, and advance manually or automatically.

Putting It Together In this draw document, you can add to the outline, which is inside a word processing frame. The header with the gradient behind the title is a frame from the paint environment. Note the expanded tool palette.

Shortcuts, a floating palette of buttons (for macros) that perform a predefined sequence of actions, works in much the same way as the tool bars in Microsoft Word and Excel. For example, there are Shortcut buttons for all of the standard text-styling features (bold, italic, and so on), and for aligning objects in the draw environment. Claris provides Shortcut buttons for virtually every function in ClarisWorks. You can also record your own macros (a series of keystrokes, mouse-clicks, and commands), and you can put them into the Shortcuts palette. For example, to automate typing the closing of a letter, you can turn on macro recording, type *Sincerely*, hit a few returns, and type your name and title. Using the Shortcuts palette, ClarisWorks can automatically insert the closing.

Conversion of 1.0 documents to version 2.0 needs improvement. An alert dialog box appears when you open a ClarisWorks 1.0 document and tells you that a copy will be opened in 2.0 format, with "[v2.0]" added to the file name. Click on OK and the converted copy opens. You then have to save the copy in order to end up with a 2.0 document. You go through this alert box every time you open a 1.0 document. For 1.0 users who may have created hundreds of ClarisWorks documents, this is uselessly repetitive. It would be better to have an option the first time the alert box appears that says, "OK, and don't warn me anymore," or a selection in the program's general Preferences area. Best of all would be the ability to drag and drop your 1.0 documents onto the 2.0 program icon and have the program automatically convert all the documents.

ClarisWorks comes with a user guide, a Getting Started tutorial, and a quick-reference card. Documentation is up to Claris's usual high standards. Tech support, though not toll-free, is knowledgeable and prompt.

ClarisWorks 2.0 once again sets the standard by which other integrated programs must be judged. It provides more features, is easier to use and faster, and has much better integration between modules than Microsoft Works 3.0 (see *Reviews*, February 1993). Impressively, Claris has managed to improve ClarisWorks without raising the price and with only a small increase in the program's size (600K) and RAM requirements (950K minimum, but it prefers 2MB). For now, ClarisWorks is the best choice in integrated packages—TOM NEGRINO

Project-Management Software

Project Scheduler 5

PROS: Workgroup planning features; improved Gantt charting and reporting; analytical tools; tracks multiple projects. **CONS:** Somewhat limited report formatting; extra data-entry steps. **COMPANY:** Scitor Corporation (415/570-7700). **REQUIRES:** Mac Plus; System 6.0. **LIST PRICE:** $695.

MW ★★★★

SCITOR'S PROJECT SCHEDULER 5 FOR the Macintosh (PS5) is designed with corporate users in mind. Although its interface lacks Microsoft Project's splashy tool bar and on-screen formatting, PS5 compensates by adding to an already full list of powerful midrange planning tools.

Impressive multiproject features help you integrate schedules of different workgroups. Gantt chart enhancements, such as a project overview line, and reporting improvements are aimed at managers faced with communicating complex project information in large business settings. Yet PS5 is also a good choice for more modest needs; the program won't confound you with complicated planning or schedule-tracking procedures.

More Flexible

PS5 LETS YOU ENTER PROJECT INFORMATION using up to eight different windows. To save time, the Job List window lets you record basic task, resource, and link information in tabular format. As projects grow in complexity, the other windows offer extra versatility. For example, the Assignment window lets you put an unlimited number of resources to work on any one task; moreover, you can decide exactly when each resource should start working after the job starts and for how long—both uncommon capabilities.

Once data is available, a time line appears on the Gantt chart. From there it's simple to adjust a task's duration, starting or ending date, or percent complete by moving the task bar. Flexible Gantt charting includes a time scale that shows dates or period numbers (period numbers can count down to a particular milestone, say, then count up from that date). And you can place text anywhere around the Gantt bar. The status of each job is clearly displayed, including the portion that's complete and the current schedule versus the original plan.

PS5 really excels at organizing project data according to Work Breakdown Structure (WBS) or Organizational Breakdown Structure (OBS) codes. Suppose you want the total duration of all manufacturing aspects of a project; just ask for all jobs that begin with the M code (for manufacturing) and they're rolled up into one neat task bar.

PS5 lets you selectively hide Gantt bars and descriptions and control which tasks are summarized. Also, you can generate an overview line on the Gantt chart that shows important milestones—a great asset when creating presentations.

The report writer lets you select fonts and include additional header fields. You get a variety of standard reports, from Gantt charts that consolidate information from multiple projects, to text-based variance reports for measuring how closely the project keeps to the original schedule and budget.

Underlying Planning Power

THIS PRODUCT STORES RESOURCE INFORMATION separately from other project data. That's an important distinction, since numerous schedules can share a common pool of people or equipment. Then, if resources are already taken by a more important job or project, PS5 automatically delays tasks that you've assigned as lower priority or indicates conflicts among critical jobs.

Workgroup connectivity is the most interesting addition to PS5. Say you have several managers working on different parts of a large job. Each manager could bring a project file to a meeting, and together the managers could build a master plan by linking the files with the Group command. You can easily accomplish this, and visually see how one project depends on another, with the PERT network diagram.

Linked projects do not act like subprojects (though subprojects are also available); PS5 automatically separates a group-level plan back into individual project files—making it easy for project managers to maintain their own plans. The separated projects now indicate where they connect to another project, so managers know when changes will affect another schedule. Plus you can retrieve grouped files to see how the projects are progressing—or pinpoint problem areas; all the links you made remain intact. And perhaps most significant, PS5 double-checks your work, so there's little chance of introducing logic errors into the plan.

Project Organization

PROJECT SCHEDULER'S NEW TREE structure diagram helps you arrange a project much like a hierarchical organization chart—starting with major task groups that are further divided into specific tasks. A utility generates WBS or OBS codes from the tree structure so you don't have to reenter data for use in other parts of the program—a step required by some project managers.

These codes, plus RBS (Resource Breakdown Structure), are invaluable when comparing or reporting project data. For instance, you can display a histogram and set the resource filter to show if the project is too dependent on a particular labor skill.

I found the Job List window valuable for more than data entry. You can resize column widths, choose which data fields appear, and display tasks in outline order (there's a modest indent option, but no multilevel outliner) for quick reporting.

Moreover, the Job List is good for batch data entry or large-scale editing, such as cutting and pasting groups of tasks. Adding or maintaining lists of resources has been simplified, too, thanks to sorting and renumbering functions. The PERT network, as before, lets you see the way tasks are connected at various zoom levels, while displaying schedule information in the task node boxes.

Superior Analytical Tools

PROJECT SCHEDULER 5 RETAINS ITS PREDECESSOR'S probability analysis mode, which lets you enter the best-case, likely, and worst-case duration for a task. Afterward, you can adjust the weighting factors to see the effect on schedules and costs. Since PS5's recalc is fast, you can examine many scenarios before deciding on the best action.

PS5's cost curve is equally complete. It shows the current plan, baseline, actual, and completed costs for the whole project. Alternatively, you can sort and filter the cost graph to get different perspectives on the project, such as costs associated with a selected resource group.

PS5 gives you expected mainstream project-management features including interactive and automatic resource leveling—and goes beyond the requisite scheduling options with inflation factors and unlimited projects in memory.

Yet what I admire most is less visible: PS5 conforms to accepted project-management standards, so you get consistent, predictable results; for instance, when you enter dates that must be met, the program doesn't override your requests with its own calculations. And technical support is outstanding.

Project Scheduler 5 can be confining; its resource calendars are basic, while cost reports may be inadequate for government projects. However, for most midrange project planning, the program's many hits far outweigh the few misses.

—MIKE HECK

Image-Cataloging Software

Aldus Fetch 1.0

PROS: Fine control of thumbnail bit-depth and compression; compact catalogs; pasteboard feature; good workgroup support. **CONS:** Slow cataloging. **COMPANY:** Aldus Corporation, Consumer Division (206/622-5500). **REQUIRES:** Mac II; 4MB of RAM; hard drive; System 6.0.7. **LIST PRICE:** $295.

MW ★★★★

Cumulus 1.1

PROS: Good network support; keyword lists; protocol file records user actions. **CONS:** Requires System 7; no image preview; no 32-bit thumbnails. **COMPANY:** Canto Software (415/431-6871). **REQUIRES:** Mac II; 4MB of RAM; System 7. **LIST PRICE:** $295.

MW ★★★

ImageAccess 1.0

PROS: Supports plug-in for Nikon scanner. **CONS:** Expensive; unusual interface; no network support. **COMPANY:** Nikon (516/ 547-4355). **REQUIRES:** Mac II; 4MB of RAM; System 6.0.4. **LIST PRICE:** $495.

MW ★★

Kudo Image Browser 1.0

PROS: Riffle function to rapidly scan images; can drag graphics directly into some applications. **CONS:** Multiple users cannot access catalog simultaneously; no keywords; cannot control thumbnail depth or compression. **COMPANY:** Imspace Systems Corporation (619/272-2600). **REQUIRES:** Mac II; 4MB of RAM; System 6.0.8. **LIST PRICE:** $295.

MW ★★

IN THE DAYS WHEN 200K FILES WERE still considered impressive, the Macintosh Scrapbook was handy for storing, browsing, and retrieving clip art. But to keep tabs on today's multimegabyte graphics, you need an image cataloger, a specialized database for keeping track of and searching for images. For this review, I looked at four image-cataloging programs for the Mac.

Creating Catalogs

ALL FOUR OF THE IMAGE-CATALOGING applications work in a similar fashion: you specify a volume or folder to scan, and the program hunts for graphics files and catalogs them. Catalogs can reference files on local or remote volumes, as well as on removable media such as magneto-optical cartridges and CD-ROMs. All the products can read standard file formats like PICT and TIFF. Additionally, Cumulus, Kudo Image Browser, and Aldus Fetch let you catalog QuickTime movies, and Kudo Image Browser and Fetch are compatible with several types of sound files. Fetch is the only program that lets you specify file names and file types to exclude from the catalog, however.

To save catalog space, the catalogers use miniature representations of images called thumbnails. To some extent, all the programs except Kudo Image Browser let you tailor the thumbnails' color depth to fit your hardware setup. For example, 32-bit thumbnails require more storage, so it might make sense to use 8-bit thumbnails if that's all your monitor can display. To further conserve disk space, Aldus Fetch and Nikon's ImageAccess let you compress 32-bit thumbnails as they are being created. (Compressed 32-bit thumbnails are often smaller than 8-bit thumbnails, but they must be decompressed for viewing, so they may take longer to display.)

Aldus Fetch provides the most options for selecting bit depth and compression method, a significant advantage when you consider that the size of the catalog and the quality of the thumbnails depend on the compression technique. Fetch lets you choose between 1, 8, and 32 bits; you can select any QuickTime compressor when you create 32-bit thumbnails (all four applications ship with QuickTime).

ImageAccess gives you somewhat less control, letting you choose among 8-bit gray scale, 8-bit color, 24-bit uncompressed, and 24-bit compressed thumbnails. Cumulus offers only low-quality and high-quality settings for 8-bit thumbnails, and it uses a proprietary compression technique. Finally, Kudo Image Browser supports only uncompressed 8-bit thumbnails.

To gauge the programs' efficiency, I cataloged a set of 75 images in a mix of file types. While all four applications occasionally balked at reading a file, none of them crashed during cataloging. Overall, Fetch was the slowest but produced the smallest catalogs (see "Cataloging Stats"). Notably, Kudo Image Browser demanded much more memory than the others when cataloging large images—I had to boost its partition to 11MB to handle one 3MB file.

Views and Searching

ALL THE PROGRAMS LET YOU VIEW CATALogs in a graphic format that displays thumbnails in a resizable window. This approach works fine as long as the catalog isn't too large, but paging through hundreds of thumbnails is tedious if you're working on a network or using a slow Mac. Fetch, Cumulus, and ImageAccess also provide a list view that shows information about each item in the catalog in text format only, so scrolling is much faster.

Kudo Image Browser's hybrid list view displays thumbnails along with text, so Kudo's scrolling is slower than with a text-only view. But Kudo Image Browser does include a unique feature called Riffle that enables you to scan thumbnails one at a time. You can zip through the catalog forward or backward at a rate of up to ten items a second, controlling speed and direction with the mouse. Using Riffle is similar to thumbing through the pages of a phone book, and it works quite well.

Finding an image in a large catalog would be a hit-or-miss proposition if you could only browse sequentially. Fortunately, all four programs also let you search for files based on text descriptions or keywords that you assign to each item (see "Search and Find"). For example, if you are cataloging a collection of animal photos and drawings, you might choose keywords based on species, size, and color. (Kudo Image Browser permits you to enter text descriptions, but not keywords.)

Fetch lets you derive keywords from file names as images are being cataloged,

continues

CATALOGING STATS

Product	Bit Depth	Time*	Size
Aldus Fetch	8	9:27	581K
	32**	11:34	2559K
	32***	10:51	644K
ImageAccess	8	4:44	770K
	24**	6:00	1439K
	24***	7:14	739K
Cumulus	Low	4:04	900K
	High	4:04	966K
Kudo Image Browser	NA	4:02	117K

* *Times are in minutes: seconds.* ** *Uncompressed.*

*** *Maximum compression.*

These times and sizes are the results for cataloging a set of 75 images in a variety of file types.

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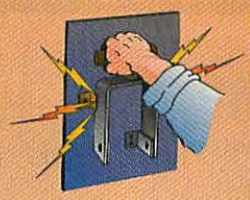

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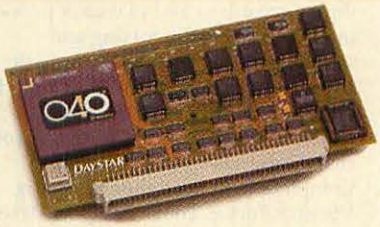

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#05710 ✓ MF2HD/DS 1.4MB Rainbow 10Pk	$9.95*
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- Functions exactly like Apple's standard 800K drive on either Mac or properly equipped Apple II series computers. 1.44MB
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Applied Engineering #04956
#05315 Cable for Mac II ... $14.98

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Getting Started with Windows 3.1, Getting Started with System 7, Intro. to PowerPoint, Beginning Word, Beginning Excel.
Personal Training Systems #06738

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- 16-bit digital audio
- Multi-source analog mixer
- Advanced 20-voice stereo synthesizer
- Standard joystick port

Finally get professional CD quality audio with direct-to-disk recording. The Pro AudioSpectrum 16 is the state-of-the art audio card for your Mac. Available in LC and NuBus configurations, this audio adapter delivers 16-bit stereo digital recording and playback providing power for audio mixing and sampling. Other features include the advanced synthesizer for great sounding music and a fully MPC compatible mixer. In the past, a card like this would cost thousands—but not anymore. Complete with headphones, Media Vision's Pocket Tools, Passport Design's TRAX, and two LucasArts games. Media Vision #06884

#06885 Pro Audio Spectrum 16 (LC version) $308

$68.98

MouseStick II

- The standard for Macintosh joysticks
- Compatible with virtually all Mac games

Grab ahold of this one and you won't let go! Five software configured fire buttons and programmable joystick execute mouse clicks and keystrokes as single shots or turbo fire bursts! Eight adjustable tension setting for fast arcade action or smooth flight simulation.
Advanced Gravis #05998 ✓

#05999 Gravis Mac Game Pad $39.98

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#00518 Lotus 123 1.1 Mac Competitive Upgrade . $164
#04413 Disklock 2.1 ..... $98
#05025 Snooper 2.0 w/ Free Virex $128

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The TARGUS Notepac Case is specifically designed for Notebook-style computers and related accessories. The fully adjustable padded computer section measures 14"x11"x2.5". An adjustable padded divider separates the computer from a power supply, A.C. adapter, cables and external keyboards or modems.. TARGUS *#06023*

$99.98 TARGUS Leather Notebook Case

A leather notebook case for under $100? That's right! This new case from TARGUS is made of full-grain cowhide and features a 15"x11"x2.5" padded computer section, a three-slot accordian file section, an accessory pocket and a zippered document pocket. Add a detachable shoulder strap, three disk pockets, pen and business card holders and you can travel with your computer in luxurious leather, without breaking your budget. TARGUS *#06610*

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David Burcham
Vice President Sales

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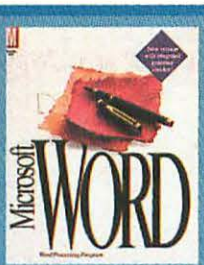

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Microsoft Corp. *#00596*

#04898 Microsoft Word 5.1 .... $294
#00427 Microsoft Office 3.0 .... $474

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06231	ACT! for Mac 1.1	148
99491	Adobe Illustrator 5.0	364
99496	Adobe Illustrator 5.0 CD Upgrade	188
04042	Adobe Photoshop 2.5 for Mac	548
06333	Adobe Super ATM Upgr	48.98
05808	Adoe Illustrator Upgr	139
00333	Aldus Freehand 3.1	393
06666	Aldus IntelliDraw Competitive Upgrade	94
04573	Aldus PageMaker 5.0	579
00346	Aldus Persuasion 2.1	324
04190	Aldus SuperPaint 3.0	98
00803	Canvas 3.0	258
04466	Claris Works	196
06713	DateBook Pro/Touchbase Pro	88.98
04180	Design CAD 2D/3D	159
03478	FileMaker Pro 2.0	268
00665	Fractal Design Painter 2.0	274
03582	FrameMaker 3.0	494
04949	In Control 2.0	88.98
00588	Inspiration 4.0	178
00518	Lotus 1-2-3 Competitive Upgrade	98.98
05969	Mac Value Pak	39
04073	MacDraw Pro 1.5	274
06840	MacP&L	168
04140	MacProject Pro	398
03540	MiniCAD Plus 4	594
04046	More After Dark Bndl 2.0	38
00227	MS Excel 4.0	294
04545	MS Excel Version Upgr 4.0	94.98
02581	MS FoxBase+/Mac 2.01 Sngl	328
00427	MS Office 3.0	474
00427	MS Office 3.0	474
01220	MS PowerPoint 3.0	328
06300	MS PowerPoint 3.0 Upgr	118
04161	MS Project for the Mac 3.0	444
04898	MS Word 5.1	294
00567	MS Works 3.0	158
04720	Nolo's Living Trust	43.98
04890	Norton Utilities 2.0	94
00642	PowerPrint 2.0	94
04736	QuarkXpress 3.2	588
00853	Quick Art Dix CD-ROM	218
00116	Sam 3.5	65
04768	SoftPC Professional 3.0	198
06579	TimesTwo	88.98
03972	WordPerfect 2.1	278

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01871	Aatrix Payroll 4.0	108
03664	Access PC 2.0	59
06263	Adobe Dimensions	128
04670	Adobe Premiere 3.0	428
05702	Adobe Premiere 3.0 Upgr	148
06319	Aldus Fetch	198
05493	Aldus Personal Press 2.0	98
06602	ALERT!	114
05379	Algebra I-Homework Tutor	49
06297	Apple Font Pack	68
05431	Apple QuickTime Starter Kit	104
05475	AppleShare 3.0.1 Server	998
06298	AppleTalk Remote Access	158
06296	AtEase	48
04955	Auto Doubler 2.0	98
06850	Auto Doubler/Disk Doubler Bndl	84.98
04830	BluePrint 4.0	218
06209	Cachet 1.02	398
00699	Claris Resolve Competitive Upgrade	98.96
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04805	Deltagraph Pro	198
03609	Design Your Own Home Architecture	58.98
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06166	Essentials for PowerBook	88
06394	Falcon MC	42.98
05964	Fluent Laser Fonts Lib Two	65
00258	Folderbolt 1.02	71
04537	Fontographer 4.0	258
04497	Hayes Smartcom II 3.4	83
04302	HyperCard 2.1 Dev Kit	138
00815	Infini-D 2.5	698
06887	Kodak Photo CD Access Software	34
01159	Mac Flow 3.7	214
05432	Mac PC Exchange	68
04916	MacLink + PC 7.0 w/ Cable	129
00839	MacroMedia Director 3.1	798
00838	MacroMedia Three-D 1.2	998
06310	MacroModel	998
03481	MacTools 2.0	99.98
05899	Magnet 1.0	88.98
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00577	Miracle Piano	348
05925	Morph 1.1	88.98
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04712	MYOB for Mac 3.0	108
00580	Now Up to Date 2.0	65
04191	Now Utilities 4.0	94
00657	Ofoto 2.0	274
04806	Org Plus for Mac 1.0	124
05745	Peachtree Insight Accounting for Mac	298
05668	Pixar Typestry 1.1	186
05690	PowerMerge	78.98
04769	Publish It Easy 3.0	112
03771	Quick Keys	95
04230	Quicken 4.0	44.98
02586	Retrospect 2.0	146
05984	ReUnion-Family Tree	114
06157	Sketcher	93
05026	Snooper 2.0 SW & NuBus Card	178
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04541	Soft PC Universal 3.0	98
06715	Soft PC with Windows	299
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04088	Stratavision 3D 2.6	628
05827	Stuffit Deluxe 3.0	68.98
04776	Suitcase II 2.1	49
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04178	Think Pascal 4.0	164
04066	Think Reference 2.0	89
04347	TypeStyler 2.0 w/ATM	125
05323	Userland Frontier 2.0	184
00641	Write Now 3.0	41.98

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06513	A.E. DataLink PowerBook 160, 180	499
04956	A.E. Plus Drive 1.44/800K FD	298
05628	Axion Serial Switching Device	128
06654	Daystar 33MHz Turbo 040 For Mac CI & SI	1438
04322	Daystar Universal PowerCache 50MHz / FPU	898
05684	Global Village PowerPort Gold	398
06267	Global Village TelePort Gold	398
05176	Kensington TurboMouse 4.0 Trackball	110
06251	Microtek Scanmaker II	928
06252	Microtek Scanmaker II XE	1214
05849	NEC CD Express Mac W/ CDR 25	349
06722	NEC Multispin CDR 74-1	636
06701	NEC SilentWriter M95F	1349
05393	6MB PowerBook 140, 170	278
06692	10MB PowerBook 160, 180	498
05653	1MBx8 - 80ns 2 Pack	89
05655	2MBx8 - 80ns 2 Pack	156
05656	4MBx8 - 80ns 2 Pack	318
05654	4MBx8 - 80ns 4 Pack	636
06697	16MBx8 - 70ns Low-profile	2636
06729	4MB - 70ns 72 Pin	158
06755	8MB - 70ns 72 Pin	318
06808	16MB - 70ns 72 Pin	598
06756	8MB - 60ns 72 Pin	368
06215	Performantz 105MB Ext	358
06222	Performantz 105MB Int	216
06576	Performantz 14.4 Ext Fax/Modem	249
06575	Performantz 24 / 96 SR	119
02181	PLI Infinity 40 Turbo HD	525
06547	PLI Infinity 88 / R-W 44	719
00182	PLI Infinity 88 Turbo HD	648
04698	PLI Infinity Opt Sony 3.5" 128MB	1549
06546	PLI Toshiba CD ROM Drive Multisession	699
06022	PowerBook Battery 140/170	62.98
00062	Promethus Promodem 144 Ext	268
06552	Radius PrecisionColor Pivot #0356	998
05250	Radius Rocket 33	1588
05650	Radius VideoVision #0355	2098
05117	Supermac Spectrum 24 Series IV	872
06100	SuperMatch 17 T Trinitron Color Display	1149
05123	SuperMatch 17 Multimode Color	999
05127	SuperMatch 20 Color Display	1618
00413	Supra Fax Modem V.32BIS w/ Sft Cable	293
00414	Supra Fax Modem V.32BIS w/o Sft Cable	249
02183	Sydos Syquest 44MB Cartridge Unformatted	70
00183	Sydos Syquest 88MB Cartridge Unformatted	106
04096	TI PS 17 Laser w/ Apple Talk	1198
00599	Umax UC 630 Scanner w/ Photoshop	1248
06593	Wacom Art Z	327

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05660	4MBx8 - 80ns FX 4 Pack	672
05819	4MBx8 - PAL II or IIx 4 Pack	672
05354	A.E. Full Cycle PowerBook Battery Charger	104
05689	Altec ACS300 Speaker System w/ Sub woofer	298
00847	Asante EN/SC	328
03642	Asante MC+IIET64 for Mac II Performa 600 TK/10T	155
00511	Asante MC3NB for Mac II Performa 600 TN/TK/10T	218
05068	BJ-10eInk Refill Black 2 Pack	15.98
01584	Datadesk Mac 101E Keyboard	125
04318	DataDesk Mac 101e Keyboard w/Quickeys II 2.1	149
00321	Dayna Etherprint Plus 4 Dev	449
00322	Dayna Etherprint T Plus 4 Dev EP0421	449
06653	Daystar 25MHz Turbo 040 for Mac CI & SI	1189
06478	Daystar 33MHz Turbo 040 for Mac II, IIx, IIcx, SE/30	1438
06482	Daystar Charger	867
04634	Daystar Universal PowerCache 33MHz / FPU	498
04320	Daystar Universal PowerCache 40MHz / FPU	678
04321	Daystar Universal PowerCache 50MHz	768
04739	Farallon 24 Port Star Controller PN377-1	1298
00832	Farallon Phonenet DIN 8 PN308	32
06265	Global Village TelePort Bronze	179
06266	Global Village TelePort Silver	338
06543	Hayes ACCURA 144 + FAX144 Ext	258
09916	Iomega Bernoulli 90MB Cartridge 3 Pack	438
05177	Kensington Notebook Keypad	78.98
04690	Kensington NoteBook Traveler Deluxe Case	78.98
06512	Kensington NoteBook Traveler Executive	112
02813	Keytronics Mac Pro Plus Keyboard	128
05831	Logitech Fotoman	638
04258	Logitech MouseMan	76.98
02561	Logitech Scanman Mod 32 Digital Darkroom	295
06280	Lyte PowerPoint (Laser Light Pointer)	98.98
99801	NEC Multisync 15" Mtr 3FGe	629
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05521	Pantone Process Color Imaging Guide 1000	61.98
06216	Performantz 210MB Ext	528
06574	Performantz 2400 Modem External	76
06587	Performantz Powerbook 14.4 Fax/Modem Int	289
05813	PLI DAT 3.5" Gig w/Built in Compress for 8 Gigs	1699
04817	PLI Infinity Floptical 3.5" Ext 21MB	429
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00907	Promethus Home Office Ext	198
00877	Promethus Ultima Home Office Ext	378
05700	PSi COMstation Five High Speed Fax Modem	439
05496	Radius Precision Color 24XP #0380	538
04899	Radius Precision Color 29" Display #0387	2489
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04118	RasterOps 24XLI	2048
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06101	Shiva LanRover / 4E (Apple Talk)	1758
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05270	Solid Wood Stackable Disk Holder (140 3")	25.98
06404	Sony 3.5" Rewrite M.O. 512 Byte/Sec 128MB	60
06413	Sony 5.25" Rewrite M.O. 1024 Byte / Sec 650MB	135
05068	Stylewriter Ink Refill Black 2 Pack	14.98
06476	Supermac SuperView	364
06234	SuperMatch 20 T Multimode Trinitron Color Display	2698
04351	Supra Fax Modem Plus	149
06363	Targus Business Traveler - Standard Version	198
06610	Targus Leather PowerBook Case	100
06023	Targus Notepac Case Black	36
05284	Targus Premier Leather Notebook Case	138
07454	Targus Universal Notebook Case	69
04666	Texas Instruments Toner Kit	48
02212	Thunderware Lightning Scan 400	358
00520	Thunderware Lightning Scanner Pro 256	488

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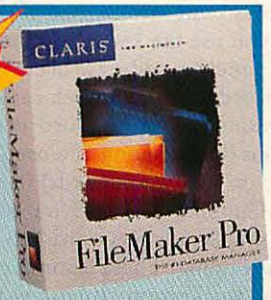

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Claris *#05571* ✓
#03478 FileMaker Pro 2.0 ... $268

COMPETITIVE UPGRADE

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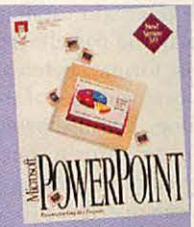

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- Build powerful presentations right on your Mac!
- Easy-to-use outlining and graphics
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Upgrade now from a competing presentation graphics program (requires proof of ownership). Microsoft *#06300*
#01220 Microsoft PowerPoint 3.0 ..... $328

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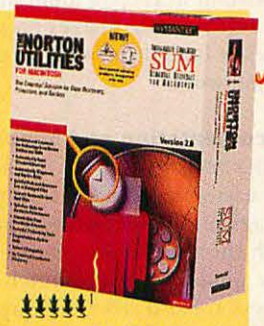
- Enhanced control palette gives you precise controls for rotation, skewing and reflection
- Increase your productivity with faster printing

Aldus *#04573*

The Essential Utility Solution for Data Recovery, Protection & Back-up

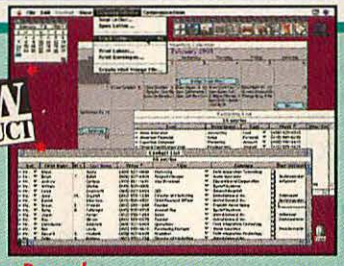


$94.98

Norton Utilities 2.0

Norton Utility combined with SUM technology offers you an easy-to-use utility with disk repair, data recovery, auto back-up, data security and productivity tools – all in one product. On a Mac at home or over a network, Norton Utility makes day-to-day functions a breeze. Symantec *#04890* ✓

NEW PRODUCT



Success Depends on Quick Response!

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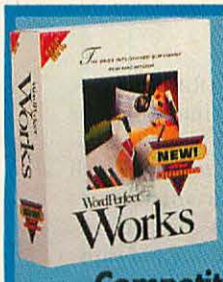
Field Assistant's relational design allows you to track your contact, company and activity information independently or jointly. This flexibilty makes it an excellent choice for professionals managing individual and business relationships. Fit Software *#06955*

COMPETITIVE UPGRADE



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WordPerfect Works Competitive Upgrade

If you're currently using a competing works program, you can have all the power and function of WordPerfect Works at this special competitive upgrade price!
WordPerfect Corp. *#06302* ✓
#06303 WordPerfect Works 1.2 ..... $148

Save $9 on this bundle

$88.98

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- All you need to manage your day right at your fingertips
- Keeps you organized and on track

After Hours Software *#06713*

Automatically assembles texts and graphics

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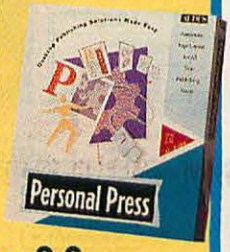

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a function that's useful if you routinely use file names that are descriptive. Fetch also is capable of extracting thumbnails, keywords, and descriptions directly from files that include them. Because keywords work best if they're used in a consistent fashion, it helps if you can define lists of keywords for users to choose from while cataloging, a feature found only in Cumulus. (Alas, none of the programs incorporate a thesaurus; so they do not know to look for *dog* and *puppy* when you search for *canine*.)

Both ImageAccess and Aldus Fetch let you search by multiple criteria simultaneously—for example, by file name, type, and keyword. The Fetch search dialog box is similar to System 7's Find command, so it's easy to use, and you can save search criteria for later use. ImageAccess's interface is less conventional; I found the combination of dark background and light text hard to read, especially on a black-and-white monitor.

Manipulating Images

WHEN YOU SELECT AN ITEM IN THE graphic or list view, all four of the catalogers let you open the original file using the application that created it. Aldus Fetch, ImageAccess, and Kudo Image Browser also let you preview images without leaving the program; if the item is a QuickTime movie, Fetch lets you play it using a standard QuickTime movie controller. If the item's volume cannot be found online, you are prompted to mount or locate it. (Both Fetch and Kudo Image Browser can also play sounds, although Image Browser oddly refers to them as images.)

The pasteboard, a window where you can temporarily store any number of thumbnails from an open catalog, is a welcome feature unique to Aldus Fetch. As with the main catalog window, you can display the pasteboard in either graphic or list format. Fetch also lets you define projects, subsets of items from a single catalog. Because projects contain references to items rather than thumbnails, they can be saved in compact files that you can distribute to other members of a workgroup.

All of the catalogers let you copy items into another application's document by cutting and pasting; Fetch also supports a function that lets you paste a reference to a file (rather than the whole file itself) into another document. And for programs that support Apple events, you can send file references to other applications without leaving Fetch. Although there are few compatible applications, this feature may become useful as more programs become Fetch-aware. Kudo Image Browser incorporates a similar function that lets you drag graphics to open documents in either Aldus PageMaker or QuarkXPress.

Networking

BOTH FETCH AND CUMULUS PROVIDE specific network support for workgroups. Fetch users can share catalogs under System 6 or 7, and multiple users can search and preview items at the same time. (Not all features are available under System 6, however.) Users must enter a password to update or delete items from the catalog.

Cumulus uses a server application and System 7 file-sharing and program-linking to let multiple users access a database. (The server workstation can be used for other tasks.) Cumulus relies heavily on features built into System 7—for example, you use the Users and Groups control panel to add new users and to set passwords. To help track catalog usage, Cumulus lets you record certain user actions (like opening or closing the database, or adding keywords) in a protocol file. Cumulus also lets you assign a status (say, Needs Keywords) to each item in the catalog. These features can be useful in workgroup situations where it's important to know who's doing what to a catalog.

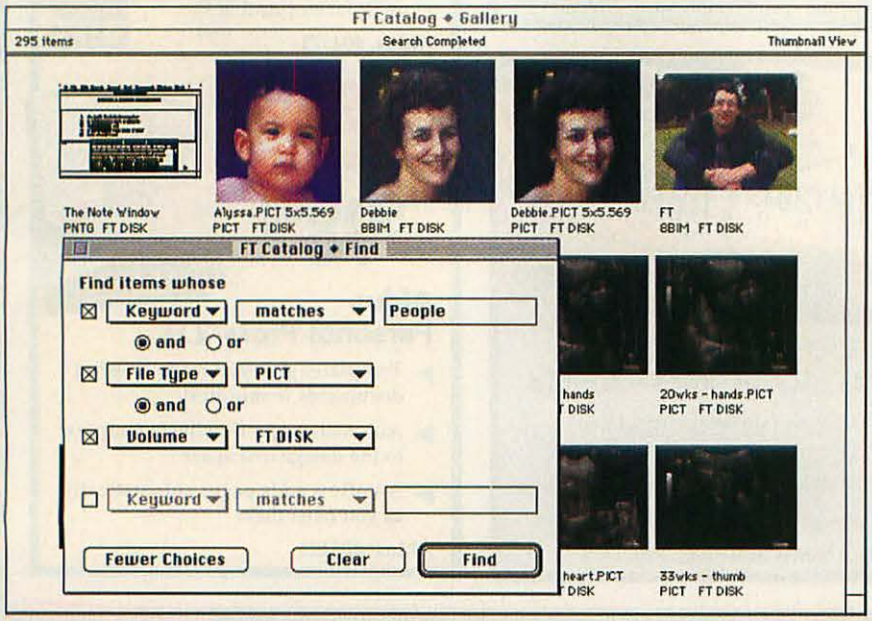
Performance in browsing and searching catalogs over a LocalTalk network is acceptable for both Aldus Fetch and Cumulus, although Ethernet and a dedicated server are recommended for large workgroups and catalogs. However, it is important to keep in mind that previewing and opening images on remote volumes is bound to be slow, even over a fast network.

Documentation and Support

KUDO IMAGE BROWSER'S USER GUIDE IS the easiest documentation to read, although one minor feature is missing from both the manual and the Read Me file. The guides for Aldus Fetch and Image Access are also clear, although the latter would benefit from an index. The Cumulus manual provides a good deal of useful information, but its stiff wording and repetition make for slow reading. Telephone support was adequate for all of the applications except ImageAccess: two messages that I left on Nikon's tech-support line went unanswered for more than a week.

Sorting It Out

DESPITE ITS SLOW CATALOGING TIMES, Aldus Fetch is the clear winner because of its rich feature set and network support. For the same price or less, Fetch offers a number of important features that are missing from its competitors. Still, I would like to see Aldus add capabilities such as a keyword thesaurus and the ability to search Fetch catalogs from within other applications. For networked users who need to keep a tight rein on catalog usage, Cumulus would be a good second choice. ImageAccess and Kudo Image Browser perform as promised, and ImageAccess does provide direct support for Nikon's LS-3510AF film scanner via a plug-in module. However, for the price, neither ImageAccess nor Image Browser offers enough value to warrant a higher rating.—FRANKLIN N. TESSLER



Search and Find The Find command in Aldus Fetch lets you search by keyword, file name, file type, or volume.

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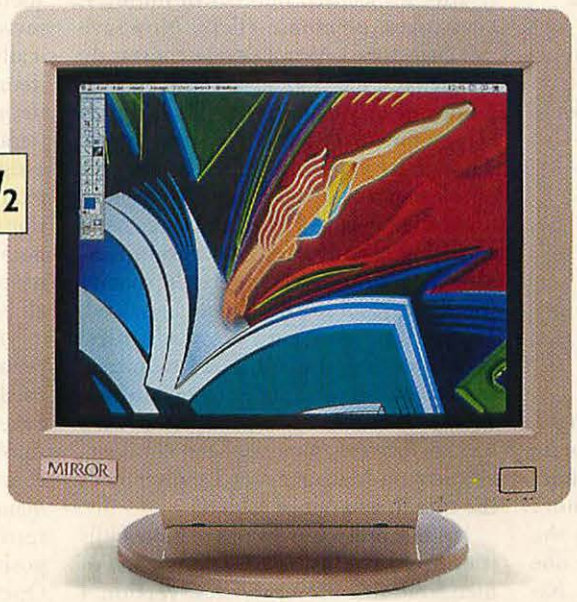

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Circle 125 on reader service card

System Utility Collection

Now Utilities 4.0.1

PROS: Collection is now better integrated, less confusing; most modules have more-logical design, additional useful options; Startup Manager no longer alters start-up files. **CONS:** On-screen alarm, security lock, and desktop art modules are gone; poorly designed, memory-hungry Scrapbook replacement; some menu module features don't work with some applications and extensions. **COMPANY:** Now Software (503/274-2800). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 7. **LIST PRICE:** $129.

MW ★★★★

EACH NEW REVISION OF NOW UTILITIES resembles the classic corporate shake-up: less-productive utility modules are kicked out, others are given more work to do, and new modules join the group. As with many shake-ups, the one that produced Now Utilities 4.0.1 has both good and bad points. On the downside, owners of version 3 will notice immediately that AlarmsClock, DeskPicture, and Screen Locker have been eliminated. On the upside, the CE Toolbox and Claris XTND system files that used to be required by some version 3 modules have been replaced by a system extension called Now Toolbox. The Installer automatically installs Now Toolbox and, cleverly, Now Toolbox manages to avoid detection by many start-up managers, thus ensuring that it always loads first. Not so cleverly, the manual has very little to say about Now Toolbox (it's not even listed in the index).

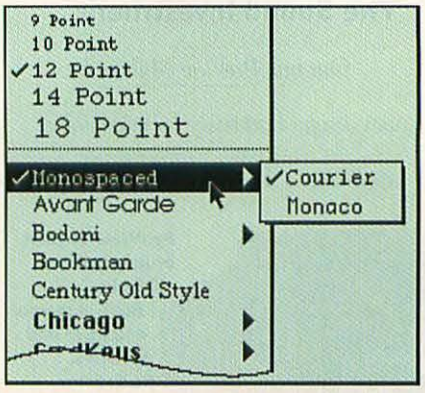
A more prominent newcomer is Now Scrapbook, an improved version of PictureBook+, a file-catalog program that originally was sold as a stand-alone utility. Unlike my Apple-issue Scrapbook, which occupies 35K of memory when in use, Now Scrapbook requires at least 500K and prefers 800K. In return for this major memory loss, you get a scrapbook capable of opening several files at once, each of which can contain text, sounds, QuickTime movies, and graphics in paint, PICT, TIFF, and EPS formats. You can view scrapbook items one at a time or as a collection of thumbnails; give each item a name and several keywords; search for items by name or keyword; rearrange the order of items; move items from scrapbook to scrapbook; edit text items; and crop, scale, measure, and select part of a graphic item. Sadly, Now Scrapbook retains all the awkwardnesses and inconveniences—and there are plenty—that made the old PictureBook+ hard to like.

All the other modules in Now Utilities 4.0.1 are major or minor revisions of those found in version 3.0. As before, NowSave saves documents automatically after a specified number of minutes, keystrokes, or mouse-clicks. NowSave can also store keystrokes in a constantly updated text file. Should you have a power failure or a system crash, this file preserves the text that wasn't yet saved. Though a very welcome addition, this option could be better designed: you have to traverse a control panel and three nested dialog boxes to get key capture running properly, and you can't specify where the resulting file should be stored.

Startup Manager, Now Utilities' extension and control panel manager, used to accomplish its tasks by altering extension and control panel files. This serious flaw has, happily, been eliminated (Startup Manager now simply moves the files in and out of folders).

While previous versions of Now Utilities had a confusing overabundance of menu-modification modules, version 4 has thankfully boiled them down to two, WYSIWYG Menus and NowMenus. WYSIWYG Menus retains all its old features: it displays items in the Font, Size, and Style menus in the stated font, size, or style; it organizes fonts in submenus by family; and it allows you to list fonts in any order. With version 4, WYSIWYG Menus also allows you to temporarily delete any font from the Font menu; assign key commands to any font, size, or style; change font or font family names; and create a different custom Font menu for each of your applications.

NowMenus incorporates the old MultiMaster, and much as in the old days, this twofer can create submenus in the Apple menu (for folders including the Control Panel, the Chooser, and now the Monitors control panel); create configurable menu-bar and/or pop-up menus of commonly used applications, files, and folders; switch color depth and sound level as you move from one application to another; and display useful information about current memory usage. With this revision, the options are much more logically organized, and you can reorder items in the Apple menu and assign each item its own font and size (except for items installed with an extension); easily assign key combinations to menu commands in the Finder and many applications (Microsoft Word being one of the notable exceptions); and create *worksets* of applications and documents that launch all items with one command.



Strange Bedfellows By changing font family names in Now Utilities' WYSIWYG Menus, you can collect any fonts you like in a pseudofamily that has its own listing and submenu in the Font menu.

As in version 3, Super Boomerang remembers the files and folders you've used recently, adds menus to Open and Save dialog boxes and a submenu to the Apple menu and your application's Open command, allows you to assign a key command to any file or folder for even faster retrieval, and returns you to your last position in every folder's file list in the Open dialog box. Super Boomerang's other major enhancement is its Find command, which can search the contents of compressed files as well as standard files.

Now Profile hasn't changed much since version 3; it still scans your hardware and software and produces a (basic or detailed) report on your system software, extensions, desk accessories, drivers, fonts, memory, and system unit. While this information may be useful in an emergency, version 4's two new options are more useful in daily life. These additions report duplicate files and orphaned aliases. Of course, Now Profiler only tells you your problems; you have to clean up your files and aliases yourself.

Although this is Now Software's fourth try, installation is still not as easy as it should be. You have to first install version 4, then update all the installed modules to 4.0.1 with a special updater program that, for some reason, doesn't know where the different modules are stored. And as with previous versions, the manual is repetitious and at nearly 300 pages, too voluminous for its subject. But these and the other shortcomings described above (including the not-ready-for-prime-time Now Scrapbook) are greatly outweighed by the many thoughtful improvements and new features. In the end, I suppose the real test is whether you're willing to throw out any of your favorite (usually single-purpose and expensive) utilities and replace them with the corresponding Now Utilities modules. In versions 1 through 3, that never happened to me. This time it did. Need I say more?—ROBERT C. ECKHARDT

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Disk-Compression Utilities

StuffIt Deluxe 3.0 with SpaceSaver

PROS: Online help; scripting; extensive archive-management tools; configurable automatic compression; converters for Unix, DOS, and other file formats. **CONS:** Can't display original size for automatically compressed items; Get Info command sometimes invokes file expansion.
COMPANY: Aladdin Systems (408/761-6200).
REQUIRES: Mac Plus; 2MB of RAM; System 6.0.5. **LIST PRICE:** $120.

MW ★★★★

ALADDIN SYSTEMS' STUFFIT DELUXE is the granddaddy of commercial Mac file-compression products. With version 3.0, it also becomes the genre's Uncle Jack-of-all-trades. The new version adds a slew of compression features and converters, as well as SpaceSaver, an automatic compression tool (also available separately for $59.95). The StuffIt Deluxe application enables you to perform ad hoc compression chores, while SpaceSaver provides background compression and automatic decompression. Finally, Magic Menu, a Finder extension, lets you easily invoke compression and decompression functions on selected files.

The package consists of two disks containing all the StuffIt tools (compressed, naturally); a hefty, well-written manual including an extensive index; and a quick-reference card. The one-step installation utility automatically decompresses all the StuffIt components and places them in appropriate folders on your hard drive. You can also opt to omit some features.

StuffIt Deluxe stores compressed files in a special file called an archive. To compress a single file with StuffIt Deluxe, you launch the StuffIt application, create a new archive, and then select one or more files to stuff into the archive. StuffIt also includes several utilities providing shortcuts to this sometimes-tedious process. The simplest of these is the Magic Menu extension, which adds a Magic menu to the end of the Finder's menu bar. You select one or more files or folders in the Finder, then choose either Stuff or Expand from the Magic menu.

System 7 users can also use the supplied drop-box utilities to perform the stuff/unstuff chores using the Finder's drag-and-drop feature. A third shortcut uses a SpaceSaver feature to compress all files having a particular suffix or Finder label. For example, changing the name of a folder from Articles to Articles.SIT instructs StuffIt Deluxe to create an archive containing the contents of that folder. Or you could select a group of files and use the Finder's Label menu to assign them all a label defined to invoke compression. The fourth and final shortcut is to write scripts in StuffIt's scripting language to automatically perform compression chores that you want done regularly, such as saving backup copies of frequently changed files in a StuffIt archive.

In addition to compressing and decompressing, the StuffIt Deluxe application lets you manage archive contents. You can use the View command to see the contents of a text or PICT file; selectively extract, add, or delete files within an archive; split a large archive into segments for storage on multiple floppy disks; and protect your archives with a password or encryption. StuffIt's many built-in conversion tools enable you to process such foreign file formats as DOS .PKZ and .ARC; Unix text, tar, .Z, binhex, and uucode; and Mac AppleLink, CompactPro, and MacBinary.

The scripting language lets you perform any StuffIt operation on files selected by Finder attributes, such as label, modification date, or type/creator. After completing a scripted task, StuffIt optionally lets you launch some other application, such as an electronic-mail program, to process the resulting archive. Supplied XTND and XCMD components let you access StuffIt functions from within other applications that support such add-ons, such as CE Software's QuicKeys, Software Ventures' MicroPhone, and Claris's HyperCard.

The SpaceSaver extension provides for automatic background file compression. Whenever your Mac is on but not in use, SpaceSaver searches the hard drive for compressible files and compresses them. SpaceSaver stops the instant you resume work. It also automatically uncompresses files—including those that have been stuffed manually with StuffIt—whenever you open them, recompressing them on saving. You can optionally delay recompression to occur during idle time, to eliminate compression delays when saving files.

You can control which files SpaceSaver compresses either by Finder label or by a customizable name suffix. The default name suffixes are *small* and *big*. Adding the former to any file name automatically instructs SpaceSaver to compress it; adding the latter prevents automatic compression (you can still compress manually). Corresponding Finder labels serve the same purpose. SpaceSaver's Preferences dialog box lets you configure these suffixes and Finder labels, specify which disk volumes to compress, choose between "faster" or "smaller" compression methods, and specify a file age threshold for automatic compression. Compressed files retain their original icons, so users see no obvious differences between compressed and uncompressed files other than size and the SpaceSaver status dialog box when a file is decompressed for use.

The only usability problems I encountered with SpaceSaver occurred when I wanted to determine the original size of a compressed file. The Finder's By Name view shows only the compressed size, and the Finder's Get Info command sometimes expands the file (if it contains a custom icon), which produces inconsistent size reports.

Tests with other compression utilities such as the shareware program CompactPro, More Disk Space (from Alysis), and AutoDoubler (from Fifth Generation Systems) showed StuffIt Deluxe to be the slowest at compression and decompression when using the "smaller" compression method. At worst, though, StuffIt was only 10 percent slower than the fastest compressor; StuffIt archives were in most instances between 10 percent and 25 percent smaller than those compressed by other methods. CompactPro, StuffIt's closest competitor in functionality and features, ran neck-and-neck with StuffIt in all tests.

StuffIt incorporates a number of reliability features to help prevent data loss due to failures during compression and decompression. First, by default StuffIt verifies all writes to an archive, protecting against archive corruption from disk errors during the compression process. Second, each file in an archive has a separate checksum, letting StuffIt detect and report a corrupted file on decompression, and to let you recover as many files as possible from a corrupt archive. Third, if there's not enough room to contain the original and a working version of the file being compressed, StuffIt will not permit compression, thus avoiding problems that some other compression utilities have when running out of disk space during compression. Finally, StuffIt does not delete the original version of files being compressed until the process is complete; if a crash occurs during compression, the original files remain intact.

With its many conversion tools, able feature set, automatic compression capabilities, reliability checks, and acceptable performance, StuffIt Deluxe makes a very good general-purpose compression tool.
—MEL BECKMAN

"I DON'T NEED (tick) YOUR DATA (tick) PROTECTION SOFTWARE (tick). I'VE HAD MY MAC (tick) FOR YEARS AND (tick) IT HASN'T CRASHED (tick) YET."

Not to alarm you or anything. But if a lot of wishful thinking is all that's standing between you and a Mac meltdown, you may want to check out a more proven method of protection.

We suggest the Norton Utilities for Macintosh v2.0. It both prevents data loss and gives you the most effective data recovery features available. In other words, it's like giving your computer its own personal bomb squad.

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To learn more, dial FAST FAX 1-800-554-4403 and select option 1, document 411. (For information on easy network installation, choose option 1, document 481.) Better yet, pick up Norton Utilities at your local dealer for about $149.*

You should probably do it today, though. Before your luck runs out.

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Thermal-Wax Color Printer

Phaser 200i Color Printer

PROS: Fast and compact; TekColor image-enhancement technologies provide excellent output quality; versatile paper-handling features. **CONS:** Output quality is poor on letterhead and inexpensive photocopier bond; $99 paper cassette required to use plain paper.
COMPANY: Tektronix (503/682-7377).
LIST PRICE: $5995.

MW ★★★

AS THE BUYERS' GUIDE IN LAST May's *Macworld* showed, color printers are becoming mainstream peripherals. Several developments are bringing about the trend: falling prices, improving performance and output quality, and the ability of many printers to print on plain paper.

Tektronix's Phaser 200i delivers in each of these areas. The latest member of Tektronix's noble color-printer family costs less than the printer it replaces, the Phaser IIPXi. The 200i is considerably faster, thanks to its innovative engine design and a fast controller. And it can print on plain paper—if your definition of *plain* matches Tektronix's.

The Phaser 200i is a thermal-wax printer—it produces output by melting pigmented wax onto sheets of paper or transparency film. Thermal-wax printers deliver faster performance, brighter colors, and more-durable output than low-cost ink-jet printers do, but they don't provide the continuous-tone clarity of dye-sublimation machines. Thermal-wax printers are middle-class scribes—ideal for creating business presentation materials and proofing spot-color publications, but second-best choices for electronic photography and high-end color proofing. (See "How to Buy a Color Printer," *Macworld*, May 1993.)

The Phaser 200i has more in common with monochrome laser printers than with most other color printers. It's relatively compact. It uses a slide-in paper cassette that holds 100 sheets of paper, and it accepts an optional ($495) second 100-sheet tray. And the Phaser 200i is easy to set up: fill the paper tray, remove two foam shipping spacers, and drop the ink roll into place.

The Phaser 200i's rear panel sports the usual connectors: LocalTalk, serial, and Centronics parallel. Optional interfaces include EtherTalk ($695) and TCP/IP with DECnet ($1495). There's also a SCSI connector to which you can attach a hard drive in order to supplement the printer's 39 fonts and boost overall performance. All interfaces are active simultaneously; the printer's Adobe Level 2 PostScript controller responds to whichever port is receiving data.

Speaking of the controller, it's a fast one, thanks to an AMD29000 chip that runs at 24MHz. In almost all of Macworld Lab's tests, the Phaser 200i turned in faster times than any thermal-wax printer tested for last May's roundup (see "Timing the Phaser 200i"). In the PowerPoint test, the Phaser 200i was almost twice as fast as the second-place finisher, Seiko's ColorPoint PSX Model 4. Tektronix has created a mean presentation-printing machine. But publishers take note: in the Adobe Photoshop test, the Phaser 200i finished a somewhat disappointing fourth.

That's too bad, because the Phaser 200i does an excellent job with scanned images. Tektronix's TekColor image-enhancement technologies, among other things, help to minimize the chunky appearance scanned images often have when they are printed on a thermal-wax printer. (Technically, TekColor provides a dithering scheme that improves on standard PostScript halftones.) Tektronix says it will provide a device profile for Apple's ColorSync color-management system as soon as Adobe releases a ColorSync-savvy version of its Level 2 printer driver, which Adobe says will happen by the end of this year.

And what about the plain-paper claim? The Phaser 200i's ink roll contains a primer medium that fills the minute peaks and valleys present on a sheet of paper. The primer is applied to only the areas that will receive ink, so the paper's overall finish appears consistent. This clever scheme, which Tektronix calls ColorCoat, allows for a wider range of paper surfaces and finishes, but still doesn't provide the broad media flexibility provided by monochrome printers as well as solid ink-jet printers such as Tektronix's Phaser IIIPXi. Forget printing on bargain-basement photocopier bond or textured letterhead—the results are unusable. High-quality laser bond such as Hammermill's LaserPrint delivers acceptable results, but the best results come from Tektronix's special coated stock (1000 sheets for $80). Tektronix is compiling a list of compatible papers; at this writing, the firm had tested 42 stocks and graded only 16 as producing output with no discernible flaws.

And one more thing. Before you can save money by printing on plain paper, you may need to spend an additional $99 for a letter-size paper cassette. The cassette included with the printer holds only the special thermal stock, which is 12 5/16 inches long (the extra 1 5/16 inch is a perforated edge you must tear off). Given that Tektronix is pushing this printer's plain-paper capabilities, you'd think the company would include the tray you need to use the stuff.

The Phaser 200i has a less-expensive sibling: the $3695 Phaser 200e, which contains 17 fonts and a slower controller that lacks a SCSI port. Both printers are limited to 8½-by-11-inch stock; if you need legal-size output (8½ by 14 inches), consider QMS's ColorScript 210 instead. But if the letter-size limit isn't a problem, buy the Phaser 200i. It's significantly faster and provides better paper-handling features.—JIM HEID

MW LAB Timing the Phaser 200i

Times are in seconds. Shorter bars are better.

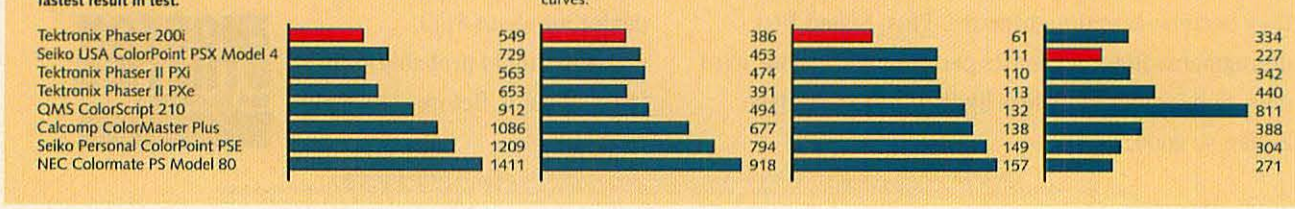
Red indicates fastest result in test.

Object-Oriented Graphic
Print speed for a complex color MacDraw Pro document with more than 840 color objects, most of them gradient-filled.

PostScript Graphic
Print speed for graphics that include special PostScript effects. We used a FreeHand illustration with nonlinear blends and Bézier curves.

Presentation Graphic
Print speed for a PowerPoint transparency with a color gradient background and several lines of text in the Times font.

Scanned Image
Print speed for a 910K, 72-dpi, 9½-by-6½-inch scanned Photoshop image with many shadow details.



Macintosh PowerBook 160

Price
$2,429

Processor
25-MHz 68030

Memory
4MB of RAM, expandable to 14MB

Disk Storage
1.4MB internal Apple SuperDrive
40MB internal hard disk drive

Networking
Built-in LocalTalk connection; AppleTalk networking software

Display
Built-in 10-inch (diagonal) backlit supertwist LCD; 16 levels of gray: 640 by 400 pixels. Connects directly to many external Apple monochrome and color displays, VGA displays, and large projection monitors

Expansion Capabilities
Two slots: one for a modem, one for RAM: supports up to six SCSI devices

Sound
Input port, output port; built-in microphone

Additional Ports
Two serial ports, SCSI port, ADB port, power adapter port, video-output port. With optional SCSI disk adapter, SCSI port allows direct connection to another Macintosh for fast file transfer

Internal Modem
Optional Fax/Data Modem or Express Modem

Batteries
Nickel-cadmium; average life 2.5 to 3 hours; power adapter included

Size
9.3 by 11.25 by 2.25 in.

Weight
6.8 lb.

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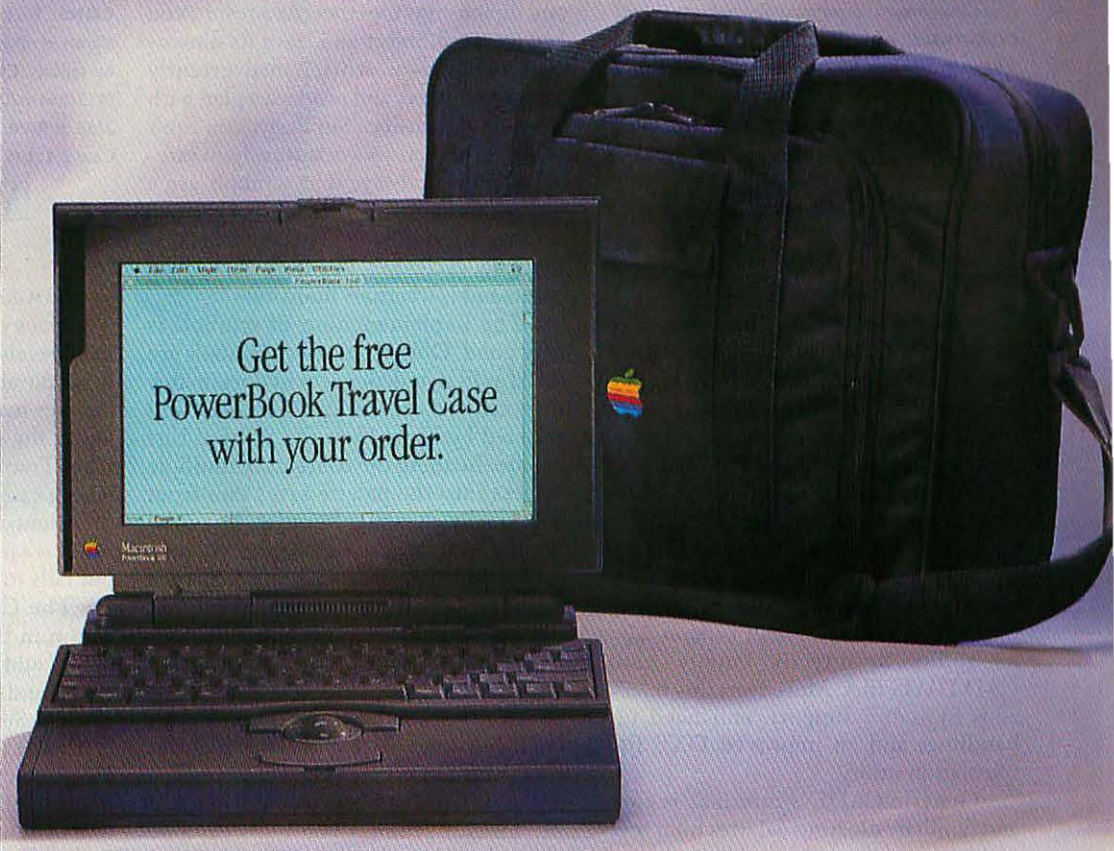

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Apple®

2-D Computer-Assisted Drafting Program

Generic CADD 2.0

PROS: Floating-point precision; extensive symbol libraries included. **CONS:** No Group command; no warning of unsaved symbols. **COMPANY:** Autodesk (206/487-2233). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.3 (System 6.0.5 and 32-bit QuickDraw for color). Recommended: 4MB of RAM; math coprocessor. **LIST PRICE:** $495.

MW ★★★

AFTER GROWING PAINS, INTERface refinements, and a corporate acquisition, Generic CADD has reached maturity with version 2.0. It's a competent, midlevel 2-D drafting program with a well-executed Mac interface, a good complement of tools, and a sprinkling of high-end features. But product development seems to be lagging. The change from CADD Level 1 to CADD 1.0 brought the revamped interface that remains the program's core. By contrast, the most salient feature of version 2.0 is its ability to directly import AutoCAD.DWG files. Moreover, this release adds System 7 support, enhanced text handling, and an improved DXF file-translation utility.

Generic CADD's interface is clean and familiar. Floating palettes hold tools and colors, provide information on objects, manage drawing layers, offer reminders on tool operation, and list the active symbol-library. Generic CADD has not succumbed to the intelligent-cursor trend, à la Ashlar Vellum, Claris CAD, and Graphsoft's Blueprint, but Generic CADD does offer good snapping functions right on the tool palette.

The Info palette is particularly well thought out. In addition to using data readouts and entering object dimensions numerically, you can select line styles and widths, assign objects to layers, and even change one symbol to another. The Color palette is another story. Although CADD 2.0 supports 8-bit color, the palette holds only 80 unmodifiable colors.

Version 2.0 retains the two-letter commands found in all versions of Generic CADD. Once you learn them, they are great for switching tools on the fly. Unfortunately, palettes still can't be toggled on with two-letter codes, and only the Info palette has a ⌘-*key* sequence.

Tools for associative linear, radial, and angular dimensioning are awkward to use because a dimension attaches to a specific point on an object rather than to the entire object. Consequently, that dimension updates only if the object is edited using that specific construction point and both the object and dimension are selected—a cumbersome process.

Generic CADD's lack of a Group command means you can't lock objects and dimensions together. As a result, you can move an object and leave its dimension behind—or worse, inadvertently nudge the object and produce a plan with a wrong dimension. Similarly, you can't combine objects to work near them safely. The manual says that symbols are a better alternative to grouping, but the two features are neither interchangeable nor mutually exclusive. The lack of a Group command is a serious omission.

The implementation of symbols is very good. Objects joined as symbols are saved as files, independent of documents, that can be organized in folders and selected by name from the Symbol List palette. Loading the contents of multiple folders into the palette saves you from continually changing libraries. Drag the symbol tool over the plan, and you can view a selected symbol and place it with accuracy. Together, the included libraries offer more than 2300 symbols

Oddly, Generic CADD makes a distinction between creating and saving symbols. Consequently, you can lose a symbol if you don't place it in a document or you neglect to save it. A dialog box warning of unsaved symbols would be nice.

To edit symbols you must explode them back to component parts and rebuild them as new symbols. You can't just edit one symbol and change every copy in the document. The Select dialog box, which searches the drawing by object types, symbols, colors, and line styles and widths, is a better mechanism for executing global changes.

Generic CADD 2.0 reads 2-D AutoCAD.DWG files, but 3-D files lose *z*-axis data. To transfer all the information, the 3-D file must first be reconstituted into 2-D plans in AutoCAD. Going in the other direction, CADD 2.0 cannot write DWG files, so you must resort to the program's DXF translator utility. However, the program can write PICT and EPS files, so you can export drawings for presentation and publication.

Generic CADD 2.0 works well, and I've always liked its elegant, pencil-line look. But today, it faces stiff competition from the lower-priced, equally adept Blueprint and the higher-cost, more-accomplished PowerDraw from Engineered Software. Still, Generic CADD 2.0 offers excellent functionality with floating-point precision. And AutoCAD compatibility makes it a good low-cost alternative.—CARLOS DOMINGO MARTINEZ

Contact-Management Software

ClienTrac 1.7.1

PROS: Easy to learn and use; good linking between client data and related information. **CONS:** No custom fields for client addresses; no alarms in scheduling; poor print formatting for reports. **COMPANY:** Whiskey Hill Software (415/851-8702). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.5; HyperCard 2.1. **LIST PRICE:** $135.

MW ★★

PROGRAMS TO HELP YOU KEEP track of your personal contacts come in all levels of complexity, from relatively simple address managers to specialized contact managers that track everything under the sun. Whiskey Hill Software's ClienTrac takes a middle approach, combining ease of use with a diverse selection of client-management features. The result is a program that performs as billed, but fails to inspire much enthusiasm.

The Client Card is the hub of the action in the program. It has fields for name, address, phone numbers, salutations, and even carrier routes for mail sorting. Surprisingly for a client manager, there's no separate company field, nor can you define your own custom address fields. You can, however, assign clients to one or more categories that you define for sorting and printing. You can also dial phone numbers, as well as credit card numbers, through a modem or the Mac's speaker. The Client Card also has a text field called File By, where you enter either the contact's name or company; this field is used as an index field by ClienTrac's Address Book.

ClienTrac's strength is that it allows you to link many different kinds of information to a Client Card. From there you have access to a Contact Log; a Personal Information Card, for data like birthdays, and spouse's and children's names; Action Items Card, with fields for actions pending and completed; and a Check List, for steps, such as send quotation and close the sale, that you intend to take with a client. ClienTrac also has an Inventory Card that can link to clients; a stockbroker, for example, could use an Inventory Card to keep track of the securities held by a client. Finally, the Timer allows you to keep track of time spent on a specific client, time-stamping the start and ending times for a phone call or appointment.

The Calendar is a simple scheduler, with year, week, and day views. There is no month view. A nice feature is that the Calendar links to the Client Cards, so that

if you're on a Client Card, you can go to the Calendar, option-click on a date and time, and the name and address of that client is entered in the Calendar for an appointment. The program doesn't have alarms, so you have to check the Calendar to be reminded of appointments. There's also a To Do list linked to the Calendar; items that are not done at the end of the day are automatically forwarded to the next day.

Finding names in ClienTrac can be a bit tricky. Usually you locate a client's name through the Address Book display, which shows a picture of an address book with letter index tabs on the left side of the screen and a scrolling list of names on the right. Double-clicking on a name in the list jumps you to that Client Card. Unfortunately, entries in the Address Book depend on the File By index field on the Client Card, and if the File By index field on the Client Card is empty, the Address Book will not contain that client's name. The second client-finding method also uses the Find By field, but gives you a Find dialog box instead of the Address Book. You can find names without the File By field by searching all the text in the database, but it is a slower process. The Address Book also lacks a separate company field on the Client Card, therefore making it difficult to list people in the Address Book by company.

The program prints form letters, two sizes of Avery labels, and envelopes, as well as any of the client information cards.

Switching between cards, especially on 68000-based Macs, is slow. Importing records from a text file (it must be tab-delimited text) and selecting a list of clients based on search criteria is very slow. Most important, there is poor control over font and style text-formatting. The body of a form letter is one big text field, so you lack the usual word processor conveniences, like tabs, indents, and the like. In fairness, these are HyperCard shortcomings, not ClienTrac's, but they are still inconvenient.

The ClienTrac user manual is mainly a step-by-step tutorial. It would be helpful to include tips on how to use features like the Inventory and Check List cards. The manual tells you how, but not why or when, you should use these features. Despite the sketchy manual, ClienTrac is fairly easy to learn.

If ease of learning is paramount to you, then ClienTrac is worth considering. But if you generate lots of correspondence, you will be better served by a program that has a built-in, full-featured word processor. ClienTrac is a useful choice for anyone searching for a contact manager.—TOM NEGRINO

Microsoft Word Add-Ons

MasterWord 5.1

PROS: Handy tables feature; useful Help menu and index; able to print bar codes with Envelope command. **CONS:** Cannot import existing addresses to new address list; skimpy manual gives incomplete and sometimes inaccurate instructions; some features don't work as advertised. **COMPANY:** Alki Software Corporation (206/286-2600). **REQUIRES:** Mac Plus; System 6.0.2. **LIST PRICE:** $99.95.

MW ★★

BEGINNING WITH VERSION 5.0, Microsoft made Word extensible, by providing the ability to add new features to the program via Commands modules. The first major package of new Word Commands is MasterWord from Alki Software.

MasterWord's centerpiece is a set of customizable tool bars, ranging from the one provided in Word 5.1 to one that remembers your frequently used features. A host of custom tool bars are devoted to specific functions, such as character, editing, tables, and more. You can also make new tool bars, by adapting the standard sets or by selecting your own icons and features from among the hundreds available. If you don't like the icons provided, you can make your own with the built-in icon editor, which provides basic bitmap drawing tools.

MasterWord also improves on a number of other Word features. The Gallery of Tables provides a palette of preformatted tables, complete with rules and borders, all of which you can customize to your needs. There is also new envelope printing that supports bar codes and address record-keeping. There's a brand-new Help menu for Word, complete with an index that lets you find help topics using a custom Find feature. Italicized index entries are defined through a pull-down menu. You can even print help descriptions. There are also enhancements to Word's find and replace, bullet, and fraction commands, as well as a new Watermark command.

Rounding out the package are a trio of desk accessories—Alki Calc, an engineering-level calculator; Alki Scale, a convenient proportion calculator; and Alki Seek, which brings Word's basic Find File capabilities to new heights of complexity and flexibility (see *Reviews*, July 1993).

It's hard not to admire the thought and effort that went into creating all those new tool bar features, but if you only use Word's keyboard commands or pull-down menus, those efforts will go to waste. Some users may even find it difficult to decide which icon goes to which function without activating balloon help. The Frequent tool bar function can be even more confusing, since every time you relaunch Word you get a different tool bar based on the functions you used during the previous work session.

Some of the other features, though attractive at first glance, lack flexibility. Anyone who frequently uses tables will like the Gallery of Tables, but customizing the width of the table cells still requires the Table Cells command, despite the manual's claims. The Watermark command is supposed to enable you to insert rotated and shaded background text on your document. Unfortunately, I got nothing but a beep when I tried to activate this feature. Even if the watermark worked, it would function only with text you enter in a dialog box. You can't import a picture and use it as a watermark.

The new envelope feature allows you to print bar codes and store a basic address list, which you can export as text. However, you cannot import an existing address list. Addresses are stored in the MasterWord preferences file. If the preferences are lost for any reason, the address list is lost as well, and although the newly released MasterWord 5.1.1 seems stable, I experienced problems retaining preference settings.

The illustrated manual is not always helpful. In a few cases it's wrong; one command was described as a desk accessory, for example.

Equivalents of both Alki Calc and Alki Scale can be found among freeware and shareware. Alki Seek works well, but I had occasional Type 1 crashes when using Seek's option to link to Claris Xtnd translators. I also found that the Copy function sometimes just didn't work. Alki's technical-support people were responsive and friendly but didn't have a ready solution.

As I said, a lot of thought and effort went into MasterWord. But it's somewhat rough around the edges. Given some development in a few key areas, it could become an indispensable addition to Microsoft Word—but not yet.
—GENE STEINBERG

An Ever-Changing Tool Bar MasterWord's Frequent tool bar records your most-used commands and updates the tool bar from work session to work session.

Texture Collections on CD-ROM

Folio 1 Media Kit

PROS: Available in very high resolutions; crisp, colorful, flawless images; all images printed in a four-color catalog. **CONS:** High-resolution images hard to access; images do not repeat seamlessly if used as patterns. **COMPANY:** D'pix (614/299-7192). **REQUIRES:** Mac SE/30; 4MB of RAM; hard drive; color monitor; CD-ROM drive; System 6.0.5. **LIST PRICE:** $299.95.

MW ★★★★

Wraptures One; Wraptures Two

PROS: Hefty supply of images; generally high-quality images; textures repeat seamlessly. **CONS:** Some low-resolution images are unrecognizable; no printed image library; browsing software is slow and works only in 8-bit screen mode. **COMPANY:** Form and Function (619/536-9999). **REQUIRES:** Mac II; 4MB of RAM; hard drive; color monitor; CD-ROM drive; System 6.0.7; QuickTime 1.5. **LIST PRICE:** $95 each.

MW ★★★

BITMAPPED TEXTURES ARE AMONG an artist's handiest resources. D'pix's Folio 1 Media Kit and Form and Function's Wraptures One and Wraptures Two are among the foremost collections of high-resolution texture images available on CD-ROM. The CDs feature a variety of natural and man-made textures, including everything from pine boughs to paper clips to human skin. You can use these textures as patterns in an image-editing or painting program, tiles in an illustration program, backgrounds in a presentation or desktop publishing application, or surface maps in a three-dimensional drawing and rendering package. You can even use a texture on the side to dress up your Finder desktop using a customizing utility such as Thought I Could's Wallpaper or Logical Solution's Chameleon.

Both D'pix and Form and Function license their products for unlimited use in documents, slides, and video productions, so long as the texture represents only a minor portion of the work, not "the primary source of the creation's value," as Form and Function puts it. Bear in mind, however, that you are no more permitted to distribute any images from this disc than you are allowed to copy other kinds of software.

Folio 1 is a three-disc collection that contains 100 full-color (24-bit) images in each of two resolutions: 900 by 675 pixels and 3192 by 2394 pixels. These resolutions equate to roughly 3½ by 2½ inches and 12 by 9 inches, respectively, when printed at 260 dots per inch. The medium-resolution images are ideal for screen presentations, easily outsizing the resolutions of 13-inch (640 by 480 pixels) and 16-inch (832 by 624 pixels) monitors. The high-resolution images consume about 23MB in memory, but they also deliver professional-quality output.

As for the merit of the images themselves, the Folio 1 discs feature some of the finest digital photography I've seen. Each image consistently provides a dynamic range of colors, highlights, and shadows; the images are free of artifacts like dust and hairs; both original photographs and scans are crisply focused; and the collection as a whole is well chosen.

Folio 1 ships with a four-color catalog of printed samples, so you can easily find an image without hunting around on disc. All of the Folio images are stored in the lossless TIFF format. Unfortunately, D'pix unnecessarily complicates things both by hiding the high-resolution images so you cannot see them at the Finder desktop and by compressing the images using Salient Software's DiskDoubler. To access a high-resolution texture, you have to use a special control panel device to copy the image to your hard drive and then decompress it. The process is clumsy and requires a good deal of free disk space, somewhere in the neighborhood of 40MB just to decompress the image.

Despite the quality of the Folio 1 images, some users will be put off by the fact that D'pix's images do not repeat seamlessly. No thought has been given to matching the left edge of the texture with its right edge, or the top edge with its bottom edge. This is because Folio 1 images are designed to serve as textural backgrounds, not pattern tiles. If you need a repeating pattern, one of the Wraptures discs is more likely to fulfill your requirements.

Sold separately, Wraptures One contains 142 different patterns and Wraptures Two contains 157 patterns. The patterns are available in a variety of resolutions, anywhere from 64 by 64 pixels to 1024 by 512 pixels, in both 8-bit and 24-bit versions. Quality-wise, the images fall slightly short of those offered by D'pix. Though they are generally acceptable, some images are muddy and others are difficult to decipher at low resolutions. The craters in the lunar-surface texture, for example, degrade until they look like nothing more than random pixels at the 256-by-256-pixel resolution and lower. To their immense credit, however, the folks who edited the images did a wonderful job. I'll wager you won't be able to distinguish the tiles in the patterns (see "Two Varieties of Textures").

Two Varieties of Textures Images from D'pix's Folio 1 collection, like the one at top, are designed to serve as single-shot backgrounds, no repetition required. By contrast, Wraptures images represent tiles in a repeating pattern. The bottom image shows how a single tile, indicated here by the dotted line, blends with its neighbors to create a seamless surface texture.

Sadly, the Wraptures discs ship without printed versions of their images. Instead, you have to slog through tedious run-time image browsers. The browser on the Wraptures One disc was created with Macromedia Director; the browser on the Wraptures Two disc is a product of HyperCard. Both are as slow as molasses, even on a high-speed CD-ROM player, and neither browser works when your screen is set to 24-bit display (a fact that is mentioned nowhere in the discs' paltry documentation or electronic Read Me files).

Folio 1 and Wraptures One and Two qualify as sturdy additions to any artist's image library. If you're a professional looking for backgrounds and large surface textures, Folio 1 is clearly the better collection. If you prefer repeating patterns, the ample supply of images on the Wraptures discs makes for a good value. If Form and Function would only include something on paper—black-and-white laser prints would be better than nothing—it would help the package tremendously.—DEKE MCCLELLAND

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Circle 146 on reader service card

Sales-Automation Software

Contact Ease 2.0.1

PROS: Easy to use; customizable; flexible sales plans; good automation. **CONS:** No built-in calendar; return addresses for envelopes are PICTs, not text; sluggish tech-support response. **COMPANY:** WestWare (619/660-0356). **REQUIRES:** Mac Plus; System 6.0.2; hard drive. **LIST PRICE:** $395; five-pack $1495.

MW ★★★

CONTACT EASE IS DESIGNED TO HELP salespeople manage their sales leads, activities, and correspondence. It uses sales plans and very good contact tracking to automate the day-to-day work flow. Sales plans can automatically generate correspondence and remind the user of such actions as phone calls and meetings. The built-in word processor with mail merge capabilities makes generating letters easy. Printing any merged letter for a contact requires only three clicks of the mouse.

Contact Ease has the usual contact-manager features along with 20 custom fields or contact logs that are automatically updated with letters and phone calls, and three levels of password protection. Unfortunately, the program doesn't include a general scheduling calendar.

To set up Contact Ease, you first enter a sales plan, which is a list of the steps necessary for a sale. A step is usually a letter or a phone call. Depending on the outcome of a step, the plan jumps to the next step, or to a later step. For example, say your first step is to make a cold call on a lead. If the call results in a sale, the plan jumps to the Sale Made step and sends out a confirmation letter. If you're not so lucky and the lead just wants more information, the plan jumps to the Send Literature step and generates a letter with the requested information. Contact Ease is flexible enough that you can modify or extend sales plans after they are set into motion; have contacts that aren't on a plan; and have any number of different sales plans.

In and Out Boxes Contact Ease uses a familiar metaphor for organizing contact information, with its index cards and in and out boxes.

The Contact Ease interface is built around a floating palette with an in box and an out box, and three cards with index tabs for each customer, with detailed information (see "In and Out Boxes"). The in and out boxes are filled with items that need to be processed as a sales plan progresses; for example, when you initially start the program in the morning, the in box contains all of the day's scheduled telephone calls. The out box contains the automatically generated letters, envelopes, and mailing labels. You can print the contents of the in or out boxes with a single command. On two of the index cards, you enter the contact information, custom field data, and activities, which can be telephone calls, letters, meetings, or other. The third card is for monitoring a contact's progress through a sales plan.

Contact Ease's CyberSwap feature lets remote users transfer data to and from a Contact Ease database in the home office. Contact Ease creates a small text file containing just the changes, which is then sent via modem like any other file. In the home office, the Contact Ease operator imports the changes file into the home office's Contact Ease database, then prints any items in the out box. With CyberSwap, the home office does all of the printing and subsequent updating of the clients' history. The updated client information can then be sent back to the users in the field. This import/export feature makes sure that everyone is using the same up-to-date client information.

Contact Ease has a few quirks. The strangest is that the field for return addresses on envelopes only accepts a PICT file pasted from the Clipboard; you can't simply type in your return address, and Contact Ease supports only one return address. Moreover, the documentation needs to be updated for the current version of the program; the screen shots don't always match what's actually on the screen.

My calls to WestWare's tech support were invariably answered by voice mail; I usually (but not always) got a call back from a technician the same day. Support answers were accurate.

Contact Ease is a good program; it helps you keep in touch with your contacts, makes it easy to generate letters, and maintains detailed records of your activities. Best of all, it accomplishes the prime mission of sales-automation software—it gives you more time with your customers, which is the key to increased sales.

—TOM NEGRINO

Large-Format Graphics-Production Tool

PosterWorks 3.0

PROS: Excellent large-format production capabilities; extensive color-correction and -calibration tools; dynamic resizing and tiling features; useful third-party templates. **CONS:** Somewhat dense array of options could benefit from a more hierarchical presentation. **COMPANY:** S.H. Pierce & Co. (617/338-2222). **REQUIRES:** Mac SE; 2MB of RAM; hard drive; System 6.0.5. **LIST PRICE:** $395.

MW ★★★★

POSTERWORKS 3.0 IS AN APPLICATION for people who think big. Really big. Up to 10,000 square feet big. Open any EPS, TIFF (8-bit gray-scale, 24-bit RGB, or 32-bit CMYK), or Scitex CT (continuous tone) file in PosterWorks and choose a new, grander size. Decide how you want the image to distribute itself across page tiles; tweak the color with full-bodied color correction and calibration tools; add a little spot color or link a font file or two, if you like; and then send the whole thing to any PostScript black-and-white or color printer (or to a service bureau equipped with the PosterWorks Bureau version of the application and a large-format output system such as a CalComp or Xerox/Versatec plotter). Do a little cut-and-paste with scissors and glue and voilà, your image now looms large.

Previous versions of PosterWorks could produce color prints, custom halftones, and process separations; version 3.0 adds the ability to include spot-color separations (when used in conjunction with Adobe Separator) and to apply a custom color to gray-scale images. Besides adding the ability to open DOS-based EPS files, PosterWorks now supports 32-bit TIFF format. An expanded dot-shape library helps you assign custom frequencies, angles, and dot shapes to each plane of color to be halftoned. Other niceties include extended alignment, scaling, and margin features.

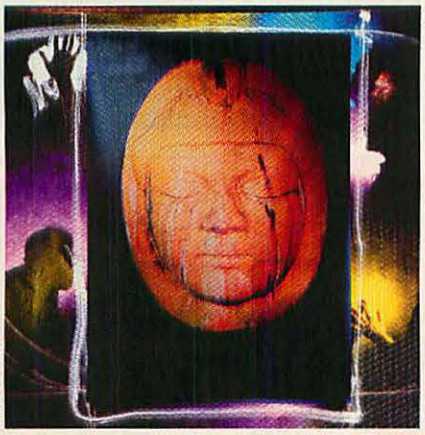
It would be nice if you could apply PostScript type from within PosterWorks, but at least version 3.0 lets you link fonts from other PostScript applications to image files, ensuring that custom or commercial fonts print correctly. Also, version 3.0 lets service bureaus send low-resolution scans to clients for positioning purposes. The fact that you can decide how much overlap and trim individual tiles will have is handy, as are crop marks that can extend into the image itself.

Perhaps the most useful new enhancement is the program's ability to

assign both fixed and variable tiling schemes to a single image. This becomes important when creating complex displays for exhibition booths that have headers and side panels, for instance. Not so coincidentally, the new version comes with templates created by several of the largest manufacturers of signage and trade-show display systems—Skyline Display, Nomadic Display, TigerMark, Godfrey Group, and Nimlok among them.

Along with these templates, PosterWorks 3.0 owners receive a listing of more than two dozen service bureaus nationwide capable of accepting and printing large-format PosterWorks files. You can even send files over a modem (if you have a fast enough modem and plenty of time). Also included is a coupon that gives you a 50 percent discount when you employ one of these bureaus. This is a great incentive for those who want to create a single dramatic image.

PosterWorks really has no competition. Brøderbund's BannerMania sits at the low end, and a few proprietary systems occupy the farther reaches of high-end, multipanel output, but PosterWorks provides user-defined, full-color, large-format output robustly and elegantly.



SCOTT PETERSON

Think Big Turning an EPS of this Curreri SF sculpture into a wall-size poster is as easy as sending a PosterWorks file to one of two dozen service bureaus, in this case Ford Graphics in San Francisco.

It's ironic that my only gripe is a function of S.H. Pierce's willingness to add features. The seemingly infinite array of tools available to the would-be billboard production artist is at once exhilarating and intimidating. The options span the horizon with little feel for topography. The manual suffers from the same information overload. One solution might involve arranging options in a more tiered structure—short and long menus, or a clear-cut sequence of defaults for novices, perhaps. All in all, though, PosterWorks can't be beat when you have that urge to blow something up.—SUZANNE STEFANAC

Desktop Customizer

ClickChange 2.0

PROS: Significant new features; useful improvements; extensive examples; powerful editors. **CONS:** Importing requires named objects; exports to proprietary formats only; deleting objects is clumsy. **COMPANY:** Dubl-Click Software (818/888-2068). **REQUIRES:** Mac Plus; System 6.0.7. **LIST PRICE:** $89.95.

MW ★★★★

EVER SINCE IT TROUNCED ITS COMpetition two years ago (see *Reviews*, *Macworld*, February 1991), ClickChange has been the uncontested king of customizing the Mac's interface. With version 2.0, Dubl-Click has added several new treats, including Patterns, Menubar, Clock, and CursorFinder.

The most significant addition to ClickChange is a feature for changing the Finder's desktop pattern, similar to Chameleon from Logical Solutions and Wallpaper from Thought I Could. ClickChange comes with 136 detailed patterns, some up to 128 pixels square. You can create your own pattern using the powerful pattern editor, or import existing ppat resources or Wallpaper patterns. ClickChange can even pick a new pattern at random as frequently as every minute.

Like Menuette (shareware, $15) and MICN (freeware), ClickChange's new Menubar feature replaces menu titles with representative icons. Dubl-Click provides 223 black-and-white and color icons designed specifically for common menu titles, plus animated icons for the Apple and balloon-help menus. Personally, I have trouble associating the icons with the menu titles, but there is a shortcut for displaying the titles on the fly, and some people find the icons helpful because they make room for other gizmos in the menu bar.

Similar to the freeware SuperClock control panel, ClickChange's clock displays the current time in the menu bar. There are options to display the time with or without seconds, date, day of the week, and AM/PM notations. Clicking on the clock cycles through the time, date, and a timer that counts up or down. You can even choose the color, font, style, size, and location of the clock.

CursorFinder is the last of the major new features. It plays one of the 13 animations at the touch of a key to help you locate a lost cursor—very useful on large monitors and the PowerBook's LCD screen. ClickChange replaces cursors with rotating cubes, bouncing balls, flying helo-cars, dogs that do backflips, and 341 other cursors. You can set the speed of the animations, or turn them off altogether. An editor allows you to modify existing cursors or design your own from scratch. You can even import cursor resources from other files.

Like the shareware SndControl and SoundMaster, ClickChange allows you to link sound effects to 52 Mac events. For instance, the Mac can burp when ejecting disks, or say "Good night" when shutting down. Dubl-Click provides 33 fun sounds that you can import into your System file. Two new improvements are the ability to randomize sounds and play sounds asynchronously for certain events.

A companion product is ClickTrax ($49.95) containing 170 celebrity impersonations and sound clips performed by stand-up comedian Steve Kaminski. Included are hilarious send-ups of Clint Eastwood, Elvis, Jerry Lewis, Ronald Reagan, a mobster, Rob Schneider's "copy guy" from "Saturday Night Live," and more. All make appropriate references to computer tasks.

Least affected by version 2.0 are the features that allow you to change colors or standard interface elements, sample alternative window designs, customize buttons (to reveal a secret editor, option-click on the button icon), and modify scroll bars. That's not to say these haven't been improved, however. ClickChange 2.0 shrinks a window to just its title bar if you click on the title bar while pressing a modifier key. The window isn't actually closed, so you can drag the title bar around the desktop. Clicking again restores the window to full size. Another silly new option is the ability to use the desktop patterns as backgrounds for the scroll bars.

With a frivolous program like ClickChange, it's unfair to criticize individual features simply because they lack universal appeal. (Besides, you can disable features globally or within certain applications to suit your needs and resolve compatibility conflicts.) But it's entirely valid to critique areas that need work. ClickChange refuses to import unnamed resources even if they are in the correct format. It should import and then allow you to name them. Also, you should be able to select multiple items in a scroll box and click on delete rather than go through a clumsy, multistep procedure using a separate dialog box.

These minor criticisms aside, ClickChange 2.0 is an excellent, well-rounded package. ClickChange has absolutely nothing you need, but is filled with everything you want—a ringing endorsement if ever I wrote one.—OWEN W. LINZMAYER

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GRA0303 $699*

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❼BackBurner is the distributed network renderer for Infini-D. Run BackBurner alone, or add an unlimited number of BackBurner Engines and watch the magic of parallel processing burn up your rendering time!
GRA0436 $105
Publisher: Specular International

$699*

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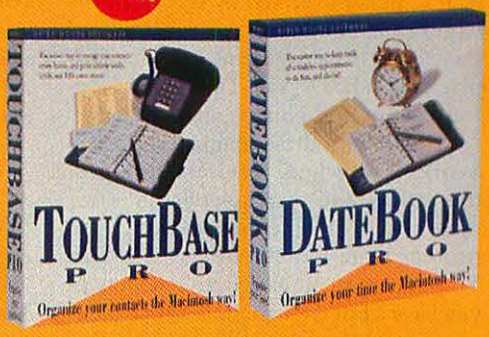
Publisher: After Hours Software
BUS0299 $89.
Also available:
TouchBase Pro DAT0104 $49 and **DateBook Pro BUS0298 $49.**

$89



MiniCad+4

❼**MiniCad+4**: An unsurpassed mix of ease of use and powerful features defines MiniCad+4. The award-winning MiniCad+ combines 2D CAD, true 3D CAD, a database/spreadsheet, programming language, intelligent interface and AutoCAD translator into one program. New features include 3D walkthrough and flyover tools, tolerancing, automatic roof, wall, and floor tools, and more. **CAD0030 $595**

Blueprint 4*

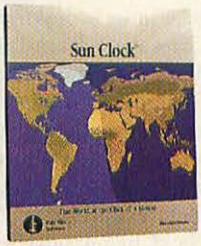
❼**Blueprint 4** makes drafting and design easy for architects, engineers and illustrators. The new version 4 incorporates all the professional 2D features found in MiniCad+4. The price/performance ratio is absolutely unbeatable. Try it on Manufacturer's 30 day money-back guarantee!
CAD0024 $219*
Publisher: GraphSoft

$219*

Sun Clock 4.0

❼Sun Clock 4.0 graphically displays the areas of day and night on a beautifully-drawn, colorful map of the world. Click to get the time anywhere in the world, click two points on the map and get the distance, or set up to 20 embedded notes linked to locations with constant time readout and access to notes and phone numbers. Great for power-book users! Comes with Pyro™ and After Dark™ screen saver modules.
Publisher: Palo Alto Software
UTI0396

$25



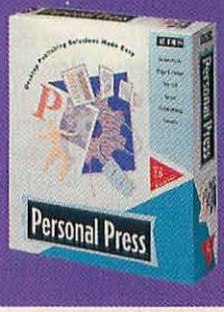
InTouch/ Managing Your Money Bundle

❼Organize your finances, contacts and time with two top-rated programs at one low price!!
"InTouch is the best of the free-form address-book packages." *MacUser*, March 1993. Awarded 4 mice. "Managing Your Money is the most comprehensive personal-finance package you can buy." *MacUser*, December 1992. Awarded 4.5 mice.
Publisher: Advanced Software, Inc.
UTI0394

$69

Personal Press 2.0

❼Aldus Personal Press 2.0 is the only layout software that intelligently assembles your text and graphics automatically so you look like an expert. Features include "Intelligent" templates, Copy Fitting adjusts your text to fit the designated space, and AutoFlow to automatically add pages. Also includes full featured word processing, text wrap, image controls, drawing tools, free rotation, and on-line help.
Publisher: Aldus
DTP0080



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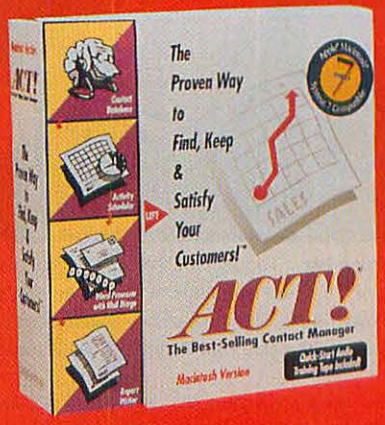


ACT! for Macintosh v.11

❼ACT! keeps up-to-the-minute files for all your contacts—with customizable fields, date-stamped notes and an auto-generated history log. The integrated activity scheduler, with graphical calendar views, lets you schedule unlimited activities. Reschedule using ACT!'s "drag and drop" feature. Produce professional correspondence, including memos, letters, fax covers and labels, with the full featured WYSIWYG word processor with spell checker. ACT! even produces standard and custom reports, like directories and activity lists, quickly and easily. ACT! is the proven way to find, keep & satisfy your customers!
Publisher: Contact Software
BUS0316

$179

Fractal Design Painter 2.0

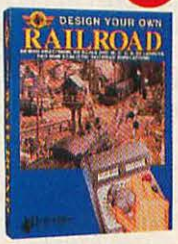
❼Painter, the award winning 24-bit color, Natural-media™ painting program, now includes photo design features. New Painter 2.0 features include image retouching, color separations, tear-off tools, visual previews, additional natural-media tools like marbling, glass distortion and liquid effects, snap-to and adjustable grid paper, Type 1 and TrueType™ font support, and straight line tools. Perfect for designers, fine artists, graphic artists, and students.
Publisher: Fractal Design
GRA0412

MacUser 6/93

$279

Design Your Own Railroad NEW!

❼Design Your Own Railroad enables you to design, build, and operate a model railroad on your Mac. Lay out the track using precision CAD tools. Draw scenery with a complete set of color drawing tools. Operation includes coupling and uncoupling, switching, pickup and delivery of loads with revenue tracking, and, of course, crashing! It's an indispensable tool for serious modelers, and fun for rail fans of all ages.
1 MB memory required, hard drive recommended.
Publisher: Abracadata
GRA0398



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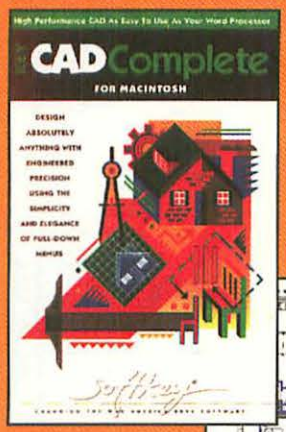

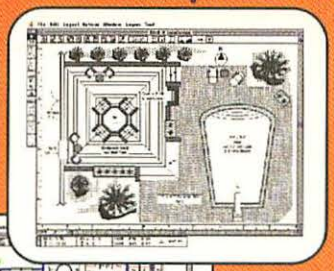

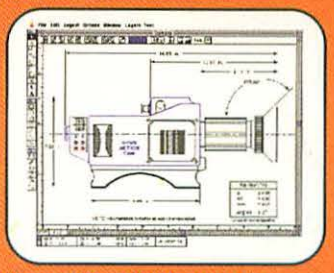

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With Help!, you can clean up your configuration and improve your Mac's efficiency. The program analyzes your system using a knowledgebase of problem-solving information covering more than 3,300 products. Help! creates an easily understood report that describes all problems detected and tells exactly how to solve them. Help! detects conflicts, incompatibilities, improperly installed files, environmental problems, damaged files, and duplicate files.
Publisher: Teknosys UTI0251 $89.
Also available: Network version for Macintosh support personnel.
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100-pack UTI0397 $1039.

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DTP0062 $99.

Publisher:
Postcraft
International
Also available:
Layouts
DTP0063 $75.

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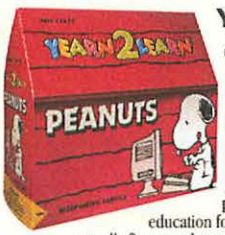

Yearn 2 Learn

Join Snoopy and the PEANUTS gang in 5 activities designed to make learning fun! Kids can learn and practice math, geography, reading, coloring and Flying Ace games. This interactive title provides hours of fun and education for the entire family and is actually five complete software packages in one! Winner of the Editor's Choice Award, *MacComputing Magazine. Requires 12" color monitor; 4 MB RAM; 11 MB hard disk space; System 6.0.7 or higher.*
Publisher: Image Smith
EDU0417

$45

MacEKG 2.0

Is your drive slowly dying out on you? Is that new extension taking more processor power than it deserves? If you use a virus program, you're checking only part of your machine. MacEKG is a professional diagnostic program that notifies you when your computer's health is below par. MacEKG performs advanced component-level tests to isolate faults and help diagnose intermittent problems. MacEKG learns how your Mac behaves and reports small problems before they become major catastrophes.
Publisher: Micromat UTI0285

1992

$89

FileGuard 2.7

"It's about as much software-based security as you can get in one package." *MacUser*, March 1992. Protect your hard drive from copying, erasure and unauthorized access (including security bypass with a System diskette). Protect applications, files, and folders (including System Folder) from unauthorized access, deletion, and illegal copying. Deny desktop alterations by unauthorized users. Keep an eye on system usage with FileGuard's User Log which continuously tracks user or group activity. System 7.0 Compatible.
Publisher: ASD Software
UTI0135

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- BUS0288 IN CONTROL 2.0 ..... 89.

Claris
- BUS0308 ClarisWorks 2.0 ..... 199.

Lotus Development Corporation
- BUS0188 Lotus 1-2-3 for Macintosh 1.1 ..... 299.
- SID0004 Lotus 1-2-3 Competitive Upgrade ..... 99.

Microsoft
- BUS0223 Microsoft Excel 4.0 ..... 295.
- UPG0010 Microsoft Excel 4.0 Upgrade ..... 129.
- DAT0047 Microsoft FoxBASE+/Mac 2.01 ..... 329.
- BUS0181 Microsoft Project 3.0 ..... 445.
- BUS0186 Microsoft Schedule+ 5 Pack ..... 269.
- BUS0243 Microsoft Works 3.0 ..... 159.
- BUS0285 The Microsoft Office 3.0 ..... 475.
- BUS0269 PowerPoint 3.0 ..... 295.
- WRD0059 Word 5.1 ..... 295.

Pastel Development
- BUS0266 Daymaker 2.0 ..... 79.

Round Lake Publishing
- Legal or Sales LetterWorks ..... ea. 45.

Softsync Publishing
- FIN0048 Accountant, Inc. 3.5 ..... 335.
- WRD0057 ExpertWriter ..... 29.

Teleware, Inc.
- FIN0087 M.Y.O.B. 3.0 ..... 109.

T/Maker Co.
- WRD0060 WriteNow Workshop ..... 85.

WordPerfect Corporation
- WRD0041 WordPerfect 2.1.3 ..... 289.

COMMUNICATIONS & NETWORKING

Apple Computer, Inc.
- NET0250 AppleShare 3.1 ..... 969.
- COM0131 AppleTalk Remote Access ..... 149.
- COM0126 Macintosh PC Exchange ..... 59.

Dayna Communications, Inc.
- NET0125 DaynaPORT E/2 ..... 269.
- NET0076 DaynaPORT E/SE ..... 149.

Expert Draw

Expert Draw is an easy-to-use draw program packed with professional features like 32-bit color, gradient fills, drag & drop custom libraries, multiple layers, Publish/Subscribe, PICT, EPSF and QuickTime movie files! Ideal for creating astounding graphics, stationary, logos, posters, maps, even screen presentations. From the makers of Expert Home Design, Expert Color Paint and Expert Astronomer.

Publisher: Expert Software, Inc.
GRA0406

$29

Farallon™ Computing
- NET0007 PhoneNET® Plus, SE & II ..... 31.
- NET0019 PhoneNET StarController® ..... 699.

Global Village (full line available)
- PowerPorts ..... Call.

Hayes
- MOD0065 Bundle 9600 ULTRASmartModem ..... 679.

Kodak Shoebox

Kodak Shoebox Photo CD Image Manager Software provides the easiest way to manage thousands of images on your desktop. You can catalog, index and search high quality images and multi-media objects as simply as point-and-click. Now you can easily index, catalog and search thousands of files by user-defined fields, along with key words, attributes and captions.

Publisher: Eastman Kodak
GRA0443

$99

- MOD0077 OPTIMA 96 for the Mac ..... 399.
- MOD0096 OPTIMA 24 Bundle 129.95

Insignia (Full line available)
- UTI0174 AccessPC 2.0 ..... 59.
- COM0144 Soft PC Universal 3.0 ..... 195.

PowerUser®
- MOD0115 24/96 Send/ Receive Fax Modem ..... 129.
- MOD0111 2400 Baud Modem ..... 69.

Prometheus
- MOD0084 Home Office 24/96 ..... 189.
- MOD0085 Ultimate Home Office 24/96 ..... 375.

Shiva
- NET0246 LANRover/L ..... 599.

TechWorks
- NET0133 GraceLAN 2.0 50-user ..... 279.

White Pine Software
- COM0143 Mac 320-VT320 Emulator 1.1 ..... 95.

Zoom Telephonics
- MOD0109 VFX V.32bis MacPack ..... 249.

EDUCATIONAL & ENTERTAINMENT

Broderbund
- CDR0042 Just Grandma and Me-CD-ROM ..... 35.
- GRA0268 Kid Pix 1.2 ..... 35.

Centron Software, Inc.
- ENT0289 CasinoMaster Deluxe Color Version ..... 45.
- ENT0440 Crossword Creator ..... 39.

Optimum Resource, Inc.
- EDU0355 Stickybear's Reading Room ..... 35.

Personal Training Sys.(Full line available)
- Excel 4.0, Word 5.1, Filemaker Pro 2.0 ..... ea. 49.

Software ToolWorks
- MUS0092 Miracle Piano ..... 349.

GRAPHICS & DESIGN

Abracadata
- CAD0032 Design Your Own Home ..... 59.

Adobe Systems, Inc. (Full line available)
- FON0295 Adobe Type Reunion ..... 39.
- FON0439 Adobe TypeStyler 2.0 w/ATM ..... 127.
- GRA0371 Adobe Premiere 2.0 ..... 429.
- GRA0430 PhotoShop 2.5 ..... 549.

Aldus
- GRA0305 FreeHand 3.11 ..... 395.
- GRA0279 Gallery Effects Vol. I ..... 129.
- GRA0354 IntelliDraw ..... 199.
- GRA0112 SuperPaint 3.0 ..... 99.
- DTP0072 PageMaker 4.2 ..... 495.
- UPG0003 PageMaker 4.2 Upgrade ..... 95.
- DTP0080 Personal Press 2.0 ..... 99.

Apple Computer, Inc.
- GRA0347 QuickTime Starter Kit ..... 149.

Claris
- GRA0350 MacDraw Pro 1.5 ..... 275.

Dream Maker
- GRA0105 Cliptures Vol. 1 Business Images ..... 69.

Fractal Design
- GRA0412 Painter 2.0 ..... 279.

Graphsoft
- BUS0184 Azimuth 2.1 ..... 299.
- CAD0024 BluePrint 4.0 ..... 219.
- CAD0030 MiniCad+4.0 ..... 595.

Gryphon Software
- GRA0378 Morph ..... 89.

Quark, Inc.
- DTP0071 XPress 3.1 ..... 549.

Ray Dream
- GRA0383 addDepth ..... 125.

Softkey Software
- FON0480 KeyFonts ..... 49.

Softsync Publishing
- GRA0366 Expert Home Design ..... 29.

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Apple Computer, Inc.
- ACC0921 LaserWriter Toner Cartridge 89.95
- ACC0922 LaserWriter 250 Sheet Letter Cassette .. 72.95
- ACC0923 LaserWriter II Letter Cassette 65.95

CoStar
- INP0196 AddressWriter Envelope Printer ..... 375.

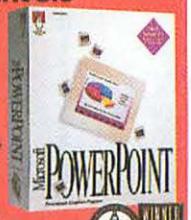
Datadesk International
- INP0174 Mac 101E Keyboard Platinum ..... 129.
- INP0183 Mac 101E w/Okeys 2 ..... 159.

Kensington
- INP0231 Turbo Mouse (SE or II) 4.0 ..... 109.

Microtek
- INP0246 Microtek ScanMaker II ..... 929.
- INP0247 ScanMaker II XE ..... 1239.

Mouse Systems
- INP0132 Little Mouse ADB ..... 74.
- INP0232 PowerPad ..... 79.

PowerPoint 3.0



PowerPoint was designed for people who need to communicate important ideas. Use integrated outlining, drawing, graphing, clip art, and templates to create presentations that get great results. Create color or B&W overheads, 35mm slides, speaker's notes and handouts. Add transition effects and automatic build slides for dramatic on-screen presentations.

Publisher: Microsoft
BUS0269

$295

SuperMac
- MON0224 20" SuperMatch Color Display ..... 1699.

POWERBOOK PRODUCTS

Applied Engineering
- ACC0833 Automobile Power Adapter ..... 69.
- ACC0834 Battery Charger ..... 109.

Battery Technology Inc.
- ACC0840 Battery for Powerbook 59.95

CMG Computer Products
- ACC0837 Powerlock for Powerbooks ..... 49.

Pax Imperia

In Pax Imperia, you are the emperor of a planet about to explore and colonize the entire galaxy. Choose your advisors, build your ships, make your economic and social plans. Up to 16 emperors can play in real-time or turn-taking mode. Sound effects and rich graphic details for planets and moons add to the excitement.

Publisher: Changeling Software
ENT0507

$35

Connectix
- UTI0297 CPU Connectix for Powerbook Utilities 49.95

Kensington
- INP0221 Notebook Keypad ..... 79.

Sophisticated Circuits
- INP0232 Powerpad ..... 79.

UPGRADES & DRIVES

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- Universal PowerCache 33 MHz ..... 399.
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- DRI0500 FastCache Quadra 700/900 ..... 279.

Mass MicroSystems
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Peripheral Land, Inc.
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- CHP0013 1 Meg SIMMs 100ns ..... 55.
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- DRI0494 Pro 105 MB Drive ..... 419.
- DRI0546 Pro 210 MB Maxtor Drive ..... 579.
- DRI0549 Pro 40 MB Drive ..... 379.
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- BND0095 88MB Syquest Removable ..... 499.

SuperMac Technologies
- DRI0437 Spectrum/8.24 PDQ ..... 859.

UTILITIES & PROGRAMMING

Abbott Systems, Inc.
- UTI0113 CanOpener 2 ..... 59.

Aladdin Systems
- UTI0302 Stuffit Deluxe 3.0 ..... 69.

Apple Computer, Inc.
- SYS0004 System 7.1 Personal Upgrade Kit ..... 79.
- SYS0003 At Ease ..... 45.

Binary Software
- UTI0348 Square One ..... 49.

Caere
- UTI0293 OmniPage Direct ..... 269.
- UTI0202 OmniPage Professional ..... 549.

Kent Marsh, Ltd.
- UTI0212 FolderBolt ..... 75.

MAXA Corporation
- UTI0353 Alert! ..... 115.

MicroMat Computer Systems
- UTI0285 MacEKG 2.0 ..... 89.

Symantec Corporation
- UTI0151 Norton Utilities for the Mac 2.0 ..... 95.
- UTI0334 Symantec Antivirus for Mac 3.5 (SAM) .. 65.

FolderBolt

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UTI0212 $75

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UTI0262 $89*

Publisher: Kent Marsh
Also available:
FolderBolt/NightWatch II Bundle
UTI0338 $129.

$89*

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More Kaboom!

With More Kaboom! you'll get zany music, wacky sound effects, and even dialogue from TV shows like Bewitched, All in the Family, Dragnet, Mr. Ed, and more! If you love your Mac, you'll love Kaboom!
Requires: Kaboom! **UTI0381 $25**

Publisher: Nova Development
Also available:
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$29*

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Graphics Utility

addDepth 1.0.2

PROS: Easy to use; has style libraries. **CONS:** Can't turn off styles. **COMPANY:** Ray Dream (415/960-0768). **REQUIRES:** Mac II; 4MB of RAM; hard drive; System 6.0.5; PostScript or TrueType font. **LIST PRICE:** $179.

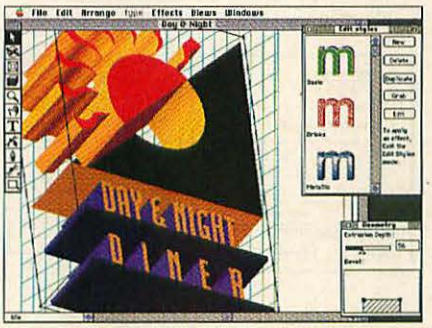
MW ★★★

FOR GRAPHIC ARTISTS, THE LEAP from two dimensions to three can be daunting. In the time it takes to master the average 3-D design package, an accomplished artist could produce dozens of illustrations by hand. If you've hesitated to make the leap, addDepth, a 3-D graphics utility, may take you part of the way.

addDepth enables you to extrude 3-D objects from 2-D outlines, then rotate the objects to any angle, illuminate them, apply colors and textures, and export the finished images for printing or for use with other programs. addDepth creates text objects directly from TrueType and PostScript Type 1 fonts and opens Aldus FreeHand, Adobe Illustrator, and PICT files. However, not all the effects possible in 2-D illustration programs survive the trip to addDepth. Text on a path, for example, must be converted to outlines before you export it from the illustration program.

Drawn or imported 2-D objects automatically extrude to the depth you have set with a slider on the Geometry palette. A Bevel Diagram lets you move handles on an outline depicting the thickness of the object to specify custom levels; you can adjust the extrusion and bevel at any time. You can import new objects to the working document; align and group objects in space; and with an easy-to-use Perspective tool, apply a consistent angle of view to every object in an illustration.

addDepth can render extruded objects with stroke-and-fill colors, gradients, and decals (PICT or EPS images mapped on a surface). An object's combination of colors and effects can be saved to libraries as a Style and applied to new objects with a single click on the Style palette. The program applies styles automatically and redraws objects with every edit, so working on complex illustrations gets tedious. It would be great to be able to turn off redraw or turn off the Styles and compose in a wire-frame or 2-D mode.



Illustrate with Depth addDepth extrudes, bevels, and colors font outlines and 2-D line art to produce 3-D illustrations.

You can save images in PICT, EPS, FreeHand, and Illustrator format; but don't throw away the native-format file—you'll need it if you make last-minute touch-ups. addDepth images saved in 2-D formats can be manipulated whole or be ungrouped. But complex extrusions that have been ungrouped down to individual Béziers can be as unwieldy as bowls of spaghetti.

For all its capability, addDepth is not in the same rendering class as full-fledged 3-D packages. It is limited to a single, movable, white-light source, and to basic, smooth-surface shadings. For photo-realistic ray tracing, you can export addDepth files to Designer, Ray Dream's affordable 3-D modeling and rendering program.

addDepth's limited purpose is to enhance 2-D images with 3-D effects. Versatile, accommodating, and affordable, addDepth lets graphic artists take a modest step toward 3-D without breaking stride.

—CARLOS DOMINGO MARTINEZ

Color QuickDraw Printer

Apple Color Printer

PROS: Convenient design with front controls; easy-to-use software includes password protection; large-format capability. **CONS:** Slow; does not support PostScript applications; difficult color matching. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** $1659.

MW ★★★

APPLE'S FIRST FORAY INTO COLOR printing is a large-format, QuickDraw-based, networkable, ink-jet device. It comes with 64 TrueType fonts (more than any other Mac-compatible ink-jet printer) and includes Apple's color-matching software, ColorSync. The Apple Color Printer is the least-expensive large-format ink-jet printer available and can handle jobs from a business-size envelope to 11-by-17-inch sheets. Changing paper sizes is quick, and the printer handles various sizes and weights without jamming.

Apple's claim that the included ColorSync color-management software produces "colors in your documents [that] look the same on the page as they did on the scanned image" is overstated. ColorSync makes a visible improvement in the print quality, but even so, several tries at matching the output to the scanned image using the various ColorSync options proved fruitless. This printer's color capabilities are best suited to rough visualization or other jobs where precise color-matching is not necessary. ColorSync's custom color-matching lets you choose your printer's profile and one of three color-matching methods to help you adjust output to better match source images over a range of printing papers and conditions. There is also a handy option for keeping a printer log, and—interestingly—password protection.

The printer outputs at 360 dpi—44 percent better than the 300-dpi resolution common to comparably priced printers—and yields a consistent screen. It does a good job with gradations, producing no noticeable shade stepping. The evaluated unit did leave some streaking in the direction of carriage travel, and some subtle gradations in the highlight and shadow areas of photos got a bit splotchy. Both TrueType and PostScript fonts turned out clear and sharp text, even at small sizes and on screened backgrounds.

Although the Apple Color Printer handles PostScript fonts with ease, it falls down at printing from PostScript applications. Pages printed from Adobe Illustrator and Aldus FreeHand arrived in shades of gray. In the case of QuarkXPress, placed EPS images printed only as gray boxes. A PostScript upgrade would be very welcome.

Color printing is usually slow, and the Apple Color Printer is no exception. With ColorSync turned off, a two-page magazine spread with type, background tint, and a scanned image took 40 minutes to print from Aldus PageMaker. Turn ColorSync on, and printing slows even more; after about 50 minutes I went for a coffee break. Background printing helps; however, the color printer uses the host CPU for image processing. When called on to process additional jobs, the host Mac slows noticeably.

The printer comes with individual ink cartridges for cyan, magenta, yellow, and black, making it possible to replace one color at a time instead of all four at once. (Unfortunately, though, the ink coating the inside makes it impossible to see if a cartridge is empty or full.) Error messages, nozzle-cleaning routines, and test pages are conveniently handled through the front control panel's buttons and LED readout.

If you require large-format color output but not precision color-matching, the Apple Color Printer is a reasonable choice. It's well built and easy to use and maintain. If you need PostScript, however, you'll need to look elsewhere. And if you can do without the large-size output, you can find comparable printers at a better price.

—MATTHEW NIELSEN

Input Device

ArtZ ADB Tablet

PROS: Light, thin stylus. Convenient tablet size and weight. **CONS:** Easily misplaced stylus. **COMPANY:** Wacom Technology Corporation (206/750-8882). **REQUIRES:** Any Mac with ADB port; System 6.0. **LIST PRICE:** $449.

MW ★★★★

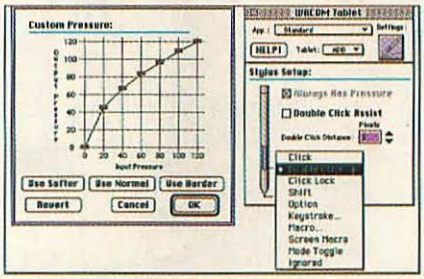
DIGITIZING TABLETS ARE THE computer-input-device of choice for graphic artists. Combining pressure-sensitive operation, manageable size, and a new pencil-thin stylus, the ArtZ ADB (Apple Desktop Bus) is perfect for artists looking for traditional-style control of their graphics programs.

Measuring 9½ by 13 inches, slightly more than ½ inch thick, and weighing less than 2 pounds, the ArtZ is thin and maneuverable. It rests comfortably on your lap, like a clipboard or sketch pad. The tablet's active area measures 6 by 8 inches and is covered with a plastic overlay that holds paper-based images in place for tracing. The active area can be scaled to represent the entire screen or a portion, oriented horizontally or vertically, and mapped to multiple monitors.

A button on the top-right edge of the tablet lets you start up the Mac directly from the tablet. The ArtZ's driver is a control panel, so you can adjust settings from within your graphics programs.

The ArtZ's cordless, one-piece stylus is thinner and lighter than that of previous Wacom tablets, and its tip remains in one position rather than compressing as pressure is applied. An immovable tip makes the stylus feel more like a pencil, but takes getting used to if you are accustomed to the play of other styluses. Tips are user-replaceable and several are included. A cordless stylus is great for drawing but is as easy to misplace as any pencil. Other Wacom tablets come with a stylus holder.

The stylus can now be calibrated to 120 levels of pressure, doubled from previous models. You can make pressure sensitivity softer or harder as your taste dictates, and you can plot custom response curves by moving sliders on a graph. With programs that support pressure input, including Fractal Design's Painter 2.0 and Sketcher and Aldus FreeHand 3.1, the ArtZ is marvelous. I kept twirling the stylus, looking for a sharp edge, as if it were a real pencil.



Software Controls The ArtZ provides a graph for adjusting tablet responsiveness and lets you customize stylus barrel-switch and tip functions.

A stylus-barrel switch lets you automate a second function—for example, a double-click or a macro operation, such as an automated drawing sequence. The ArtZ comes with Affinity's Tempo macro-recording program, but you can use any other.

Both tablet and stylus are ruggedly constructed, but take care of that stylus—replacements cost $125. The ArtZ's ADB cable lacks a pass-through connector, so the tablet must be either the last device on the chain or connected to the second ADB port. (A two-connector cable is promised.) The documentation is complete and to the point. An installer automatically loads the driver and the Tempo utility.

In only a few years, pressure-sensitivity has grown from a curiosity to a graphics-application staple, offered by over two dozen programs. The ArtZ is an affordable, conveniently sized tablet that can draw out the best from today's natural-media-emulation graphics programs.

—CARLOS DOMINGO MARTINEZ

Icon-Based File Launcher

Square One 1.5.2

PROS: Attractive; well programmed; offers group file-launching, one-click QuicKeys triggers, and default document opening. **CONS:** Abysmal manual; complicated setup. **COMPANY:** Binary Software (310/582-8293). **REQUIRES:** Mac Plus; 2MB of RAM; System 7. **LIST PRICE:** $74.

MW ★★★

SQUARE ONE SOUNDS LIKE ANOTHER clone of Tiles (CE Software), QuickTools (Advanced Software), and At Ease (Apple)—programs that pile an icon-based launching window on top of the one you already have (the Finder).

You load up Square One's floating tile palette with your favorite file, folder, QuicKeys, program, desk accessory, and control panel icons. When you're finished setting up the palette (the most complicated part of using the program), a single click on a program's icon makes its list of associated documents appear. You can open a program (or any other tile) either from the keyboard or by double-clicking on its icon.

If Square One were only a launching pad, it would be no better than Now Utilities or Microseeds' HAM. But Square One also has a feature made famous by the glorious freeware Applicon: when you move the mouse to a corner of the screen, an Active Applications palette appears, listing all the programs you're running at the moment. A single click on an icon in this palette brings the corresponding program to the foreground—a distinct improvement over the hard-to-aim-for System 7 application menu.

Best of all, Square One is infinitely customizable. Again as in Applicon, you can view the palette squares as large or small icons, with or without file names. You can make the palette any size, shape, or position. You can add, remove, or rearrange tiles. Especially useful: you can construct a list of frequently used folders that pops out from the Folder tile. When you choose a folder name, you jump to the Finder, where that particular folder is open and waiting for you.

Not for Squares Only Click on a program tile (top), see its associated documents (bottom).

When you drag a document icon—a text file, say—onto the Square One icon on the desktop, a dialog box appears that lists all your programs capable of opening it (such as Word, TeachText, and WriteNow). With a double-click, you choose the program you want to use to open the document. This is very much how Easy Open, Apple's upcoming System enhancement, will work, and it's wonderful to have it now.

Not that there isn't room for improvement. Adding a QuicKeys macro to the palette is a painful process of typing its name precisely, letter for letter. I'd welcome a feature that automatically hides one program as you switch to another, as is found in Now Utilities and the Performa Macs. And don't forget that Square One is an actual application, continually using up 400K of your Mac's memory.

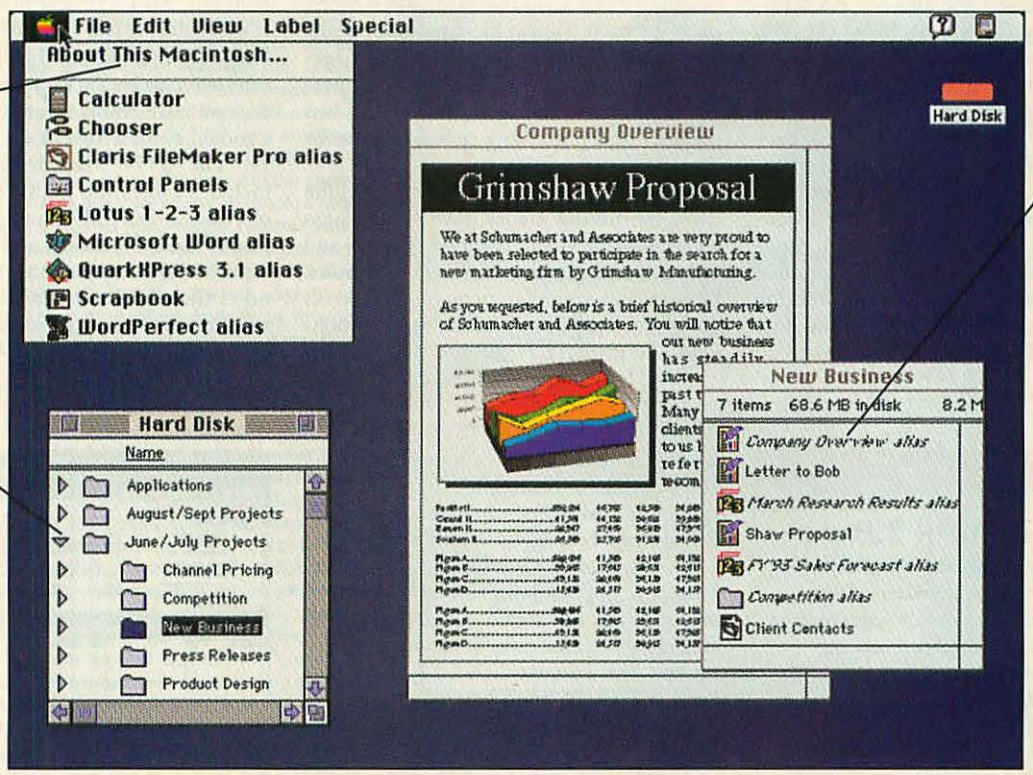
Worst of all, the manual is an unproofread comprehensional disaster. In its 32 pages of text, there are 56 grating grammatical errors.

Nonetheless, flexible, attractive Square One is the best kind of utility software: it does what you want, when you want it. More programs should be this well written.

—DAVID POGUE

How to do an honest day's work by using an alias.

The new Apple menu allows you to easily access anything on your Macintosh—files, applications, desk accessories, control panels, whatever—by simply placing it in your Apple Menu Items folder.



The Outline View feature lets you examine files inside a folder without having to open up a new window. Clicking on this triangle creates a drop-down list of that folder's contents.

Creating an alias is a great way to organize your projects so that files and applications can be in several places at once. Click on the "Company Overview" alias here, for example, and you actually open the original file containing your proposal to Grimshaw.

Finding information fast with System 7.

System 7™ software comes with an array of new tools that makes accessing information on your Macintosh® easier and quicker than ever.

To begin with, you can create an "alias." Designed to help you better organize your hard disk, aliases are not full-fledged copies of files but, rather, small 2K "pointers" to files, folders and applications, which you can put in as many places on your Mac® as needed. When you click on an alias, you actually open the original—no matter where it's located.

The new Find feature lets you search for files, folders and applications, and then actually brings them right to the front of your desktop for you.

And with Outline View, simply clicking on the triangle to the left of the folder icon creates a menu list of its contents. So you never fill up your computer screen with multiple windows trying to find that buried file.

Of course, these are just a few of the ways System 7 can help make you more productive.

They're also just a few of the many reasons why 5 million Macintosh users are now working with System 7, as well as with the more than 6,000 applications available that run on it.

For the name of the Apple® software reseller nearest you, call 1-800-732-3131, ext. 500. Or, if you're a current System 7 user, get the System 7.1 Update Kit by calling 1-800-769-APPL, ext. 250.

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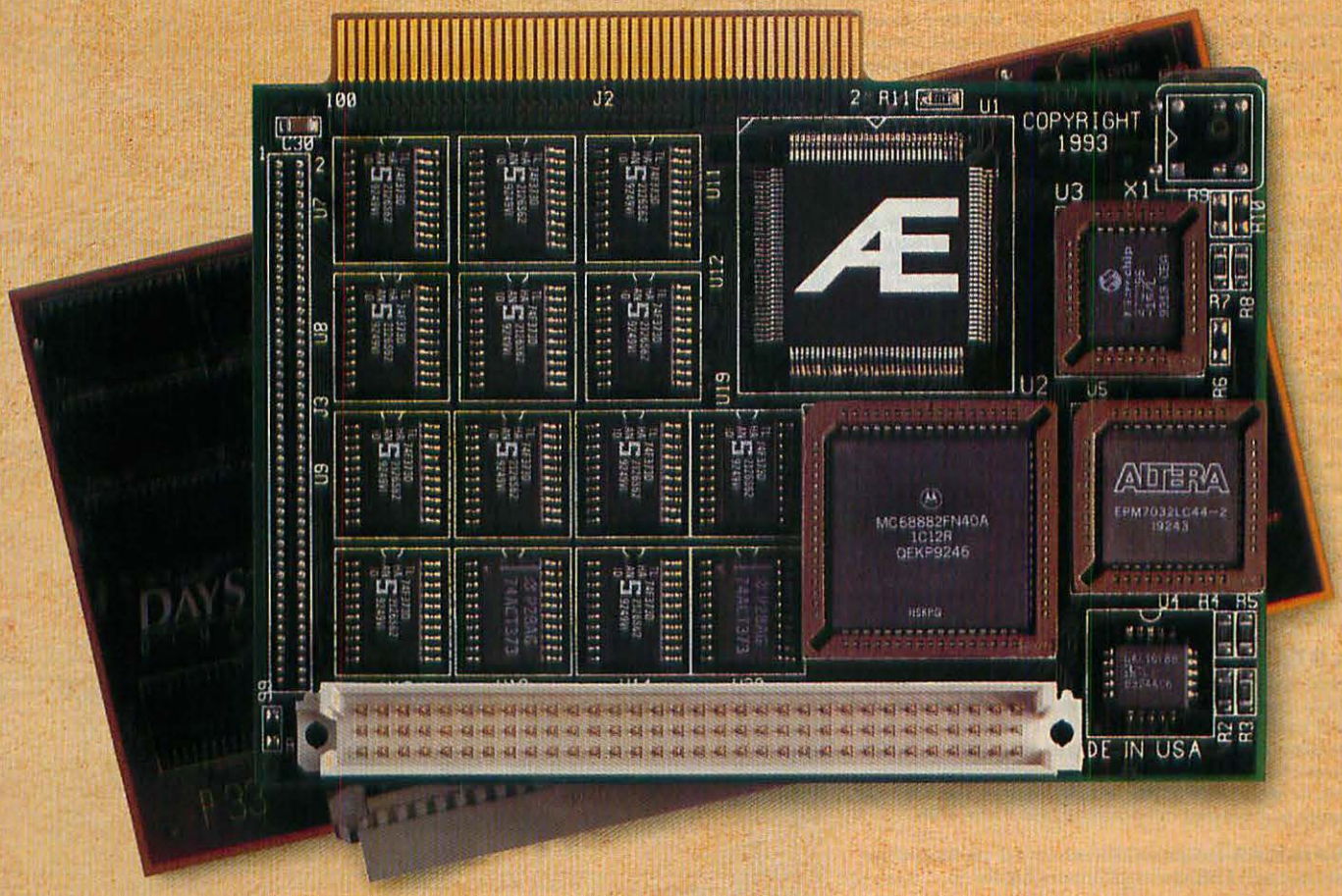

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	40 MHz w/Cache	AE	11.5	Yes	$428
		DAYSTAR	11.09	No	$698
LC, LCII Color Classic Performa 400	25 MHz	AE	1.99	Yes	$349
		DAYSTAR	NA	No	NA
	33 MHz	AE	2.65	Yes	$449
		DAYSTAR	2.52	No	$498
	40 MHz	AE	3.13	Yes	$449
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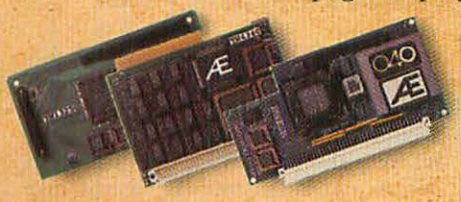

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Circle 167 on reader service card

Network Intercom System

On The Air 1.0.1

PROS: Simple interface; good technical-support and documentation. **CONS:** Sometimes unreliable; could be more intuitive. **COMPANY:** Digital Eclipse Software (510/547-6101). **REQUIRES:** Mac Plus; System 7; AppleTalk network. Recommended: Microphone. **LIST PRICE:** Two-user pack $79.99; 5 users $179.99; 20 users $639.99.

MW ★★★

USED TO BE THAT OFFICE WORKERS communicated through real-life, real-time speech. If Ayesha had to tell Robert something, he'd go over and say it. These days, in addition to the ancient tradition of shouting over cubicles, modern office workers have a variety of communications media available: E-mail, fancy phone systems, bulletin board services, and now, Digital Eclipse Software's On The Air.

On The Air bills itself as "the perfect intercom system for the Macintosh office." Using On The Air is simple: launch the application, connect to a fellow On The Air user, choose a sound, and send it. If you have a microphone, you can record sounds and send them almost instantly. If you don't have a microphone, you can buy a MacRecorder from Macromedia or Digital Eclipse for $99. Transmitted sounds play in the background on your coworker's machine—and if someone makes your computer moo once too often, you can block sounds from that user. When you use On The Air's Address Book, connecting to someone else is as easy as selecting an item from a menu.

The program must be open for sounds to be transmitted; it consumes 700K of memory. On The Air can open System 7 SND resources, SoundEdit, and AIFF (Audio Interchange File Format) sound files; sounds recorded from within On The Air can be saved as AIFF and SoundEdit-compatible files.

On The Air generally works well, with a few noteworthy exceptions. Sometimes it loses or significantly delays sounds when several are sent simultaneously. Also, it doesn't provide you with the option to delay playing transmitted sounds; if you're away from your computer when someone sends you something, it's gone. Establishing your preferences is also significantly more difficult than it needs to be, involving several more copy-and-paste steps than seems necessary.

On The Air is well designed and performs decently. The sound quality of its recordings and transmissions are good, and it runs at slow but acceptable speeds over Ethernet and LocalTalk networks.

On The Air's well-written manual is easy to follow; the only thing missing is an index. The documentation is also surprisingly forthcoming about potential problems with system configurations and settings.

It's a nice product for a nice price—but do you need it? On The Air does much of what more-time-honored technology accomplishes. For me, this software is fun to play with, but it's not much help in my daily work.

But if you're a PowerBook user dialing into a network via AppleTalk Remote Access, you could use On The Air to speak to your coworkers miles away from the office. Or you might use On The Air if you work with sound or multimedia. Picture this: you're trying to find the right ten-second clip of Mozart for your presentation, and your supervisor across the building needs to approve it. Each time you reedit the sound, you can send it to her machine.

If you're only working with System 7 SND files and a Mac that comes with a microphone, though, simple file-sharing might serve the same purpose—and save you money and precious RAM, too. If you need to send sounds over a network, On The Air does its job well. Otherwise, paper airplanes might suffice.—JOANNA PEARLSTEIN AND THE JANE GANG TESTING CREW

Simulation Add-on for Excel

@Risk 1.1

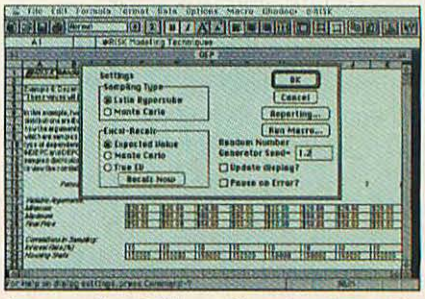
PROS: Functions add directly to Excel function set; @Risk commands appear in Excel menu. **CONS:** Harder to use than Decisioneering's Crystal Ball. **COMPANY:** Palisade Corporation (607/277-8000). **REQUIRES:** Mac SE/30; 2MB of RAM; hard drive; Excel 3.0. **LIST PRICE:** $395.

MW ★★★

IF YOU RUN A BUSINESS, YOU KNOW how much cash you have on hand, you know what you have in receivables, and you have a record of recent expenses. Almost every other significant number you could plug into a spreadsheet cell represents a speculation to some extent, since you really cannot predict a definite number for next quarter's sales or invoices, or most expenses. In simple spreadsheet work, you try a series of best-guess numbers and inspect the resulting bottom line; in a more sophisticated application you specify a desired end result and then solve backward for conditions. But the underlying reality is that numbers in the future can best be represented by probability distributions around a most-likely central value; statistical products that work with spreadsheets are now available to model this situation.

@Risk (the @ symbol is the identifier for functions in Lotus 1-2-3), the most complete modeler of this type, is available as an Excel add-on. What add-on linkage means is that a new set of functions, prefaced *Risk* (for example, RiskGamma or RiskNormal), can be used in formulas, and that an @Risk menu, for specifying sampling and recalc conditions and report and graphics generation, appears on the Excel menu bar. The advantage of this approach is that existing worksheets, including 3-D linked worksheets, can be modified to introduce fuzziness into the financial data of a working, audited spreadsheet model. Also, since the resulting @Risk model is still an Excel worksheet, it's possible to specify the results of a statistical simulation as graphics output in a properly annotated presentation graph. As a definitive capability for advanced modeling, @Risk models can be used with the built-in Solver to get information providing boundaries on the value distributions that yield specific target results.

@Risk has a few drawbacks. Because Crystal Ball, a similar product, operates as a separate program rather than an add-on, it's easier to use for experimenting in basic modeling, and it has an appealing visual method for specifying distributions. @Risk also assumes that the typical user is an Excel power user who writes fairly complex formulas and can figure out how to use third-party macro utilities to implement advanced applications. As an Excel macro document, @Risk is also slow (in Excel 4.0) using its default simulation settings on midrange Macs—the manual helpfully suggests using a IIfx or better. Finally, it's mildly annoying that the Mac version ships with a manual with examples and figures from the Windows versions of the program. Nonetheless, @Risk is capable of generating complex, statistically valid templates within Excel, and it is the first choice for analysts who work with probabilistic models every day.—CHARLES SEITER



Guesswork @Risk provides a function set for writing probabilistic formulas in Excel and a menu for directing modeling conditions. With HyperCube sampling and smaller sample sets, you can get worthwhile results even on low-end Macs.

Drawing Application

Expert Draw 1.0

PROS: Inexpensive; good set of basic tools; Grab Attributes tool saves effort. **CONS:** Parts of interface poorly implemented; polygon offers limited drawing precision. **COMPANY:** Expert Software (305/567-9990).
REQUIRES: Mac Plus; hard drive; System 6.0.7.
LIST PRICE: $49.95.

MW ★★★

WHILE EXPERT DRAW IS NOT REALly for experts (professional graphic artists will probably want to save up an additional few hundred bucks for a full-featured program like Aldus FreeHand or Adobe Illustrator), this object-oriented draw program does offer a decent set of basic drawing tools and commands.

A drawing can consist of as many layers as memory will support, allowing you to create a complex illustration by overlapping components in different layers. You can save objects in a library and open them from any Expert Draw document (the program also comes with several libraries of clip art, but the images are of only fair quality). As in other draw programs, you can group, align, rotate, scale, and reshape objects. The program supports 24-bit color, as well as such up-to-date features as publish and subscribe and QuickTime movie playback.

Expert Draw is lacking some features found in several other draw programs, however. It doesn't offer a Bézier-curve tool, which lets you draw intricate shapes made up of lines and curves. Nor does it have a set of bitmapped painting tools, as do its competitors Aldus SuperPaint, Deneba's artWorks, and Zedcor's DeskDraw and DeskPaint. But at $49.95, Expert Draw boasts a list price that's less than half that of any of its rivals.

Expert Draw offers several advanced features (such as attaching text to a path or flowing it into a shape) but lacks some basic ones. For example, you can't reshape a block of text and have the words reflow into the new rectangle; you can't see a polygon's outline when you drag it, rather than just its bounding box; and you can't place custom colors in the color palette. Other features range from useful—like the Grab Attributes tool, which lets you transfer characteristics such as line weight, fill color, and text size from one object to others—to offbeat, like the option within the Blend command that creates intermediate steps between two patterns.

Expert Draw's manual is fairly informative, but the program suffers from a few interface problems. For example, when you draw a shape, you can open the color palette to set its line and fill colors. Choose a color and click on an icon, and the object's outline color changes; but do the same for the fill color, and nothing happens. It turns out you must first open the pattern palette and set the fill pattern to solid, instead of the default pattern, which is none. A small complaint, granted, but such anomalies can make a program difficult for beginners (or manual haters) to use.

Another interface problem pertains to the program's snap-to-grid function. While all draw programs have a snap-to-grid command, Expert Draw has two: Grid Snap in the Layout menu and Snap to Grid in the Arrange menu. While Grid Snap does what you'd expect, constraining objects to the measurement units you've specified, Snap to Grid has a disconcerting way of reshaping polygons, since it aligns each vertex in a polygon to the grid. Even simple polygon editing has its problems—when you add a vertex, you can't place it anywhere you like; it's automatically centered between two adjacent vertices.

Despite the interface quirks and the abscence of a Bézier-curve tool, Expert Draw is a good program for beginning illustrators, office users, or anyone on a constrained budget. For a basic, no-frills draw program, Expert Draw is well worth its price.—ERFERT FENTON

Dictation Software

Memorizer 2.0

PROS: Simple to learn; works in the background. **CONS:** High RAM and disk requirements; incomplete, hard-to-read documentation; user interface irregularities; serious bugs. **COMPANY:** Brains Software Engineering (43-1-865-35-44 [Austria]). **REQUIRES:** Mac II; 4MB of RAM; microphone; hard drive; System 7; QuickTime. **LIST PRICE:** $100.

MW ★★

PERRY MASON WOULDN'T HAVE needed to say "Della, take a letter," if only he'd had a Mac with Memorizer software installed. Memorizer records dictation from a standard Mac microphone or add-on sound-input device as an audio-only (no picture) QuickTime movie. After recording dictation, you transcribe it by running Memorizer in the background and a word processor in the foreground. Still, you might prefer to stick with a hand-held tape recorder when you consider Memorizer's RAM and hard drive appetite, not to mention its propensity to crash.

Memorizer and QuickTime together use about 1MB of RAM and close to 1MB of hard drive space. Recordings use approximately 230K per minute. You can directly record to and play back from floppy disks with a serious but not crippling performance loss.

When Memorizer is the active application, you control it by clicking buttons and dragging sliders in its window. While transcribing dictation with Memorizer in the background, you control its functions from the keyboard. Keyboard control would be more effective if you could adjust playback speed to compensate for a slow talker or a fast talker, as you can with a conventional transcription machine.

Besides recording over any part of an existing recording like a conventional tape recorder, Memorizer can insert new dictation anywhere in an existing recording, something a tape recorder cannot do. To determine whether you want to replace or insert in the middle of an existing recording, Memorizer displays a poorly worded alert box. If you have Memorizer in the background at the time, this alert will probably be hidden by the foreground application's windows. Memorizer does not notify you that it needs to be brought to the front by such means as displaying an alert in the foreground and flashing its icon in the menu bar. If you don't anticipate the problem and bring Memorizer to the front so you can deal with the alert, you discover later that your dictation was not recorded.

Memorizer was developed in Austria, and the manual was obviously written by someone for whom English is a second language. It is incomplete, inaccurate, and in places hard to understand. Moreover, it is supplied only as a Word 5.0 document that you must reformat before printing on 8½-by-11-inch paper.

The manual does not mention that Memorizer forces balloon help to turn off. If you subsequently turn on balloon help in another application while Memorizer is running, the Mac soon bombs. Another undocumented problem is that you can rename a recording in the Memorizer window, but the Mac bombs if the name duplicates the name of another item in the same folder. Sometimes when you adjust the playback loudness, Memorizer turns off the alert sound in the Sound control panel, and you must quit Memorizer in order to get the alert sound working. My Mac often bombed if I used the fast-forward and rewind control continuously for more than about 30 seconds.

Memorizer's numerous shortcomings don't prevent it from being useful, they just make you work harder. If you dodge Memorizer's bugs, suffer its irregular interface, and have the necessary RAM and disk space, it can actually replace your tape recorder and transcription machine. —LON POOLE

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POWER PIXELS

Sigma ErgoView 17

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- User controls: brightness, contrast, position, size, pincushion distortion, misconvergence, tilt/swivel base.

11541.....ErgoView 17.....1297
11463.....ColorMax 20T.....2199

SUPERMAC

SuperMatch 17" Trinitron

High Quality, Low Price 24-bit Color Monitor

The SuperMatch 17T non-interlaced multi-sync monitor features three resolution modes: 1024 x 768, 832 x 624, and 640 x 480. This high resolution Trinitron monitor is compatible with Macs using built in video. Comes with a tilt and swivel base.

#11569 $1199

VideoSpigot

Pour Video Into Your Mac

The VideoSpigot Digital Video Frame Grabber is a digital-video system for making QuickTime movies. Captures full-motion video in real time at speeds up to 29.3 frames per second with 24-bit color in a 160 x 120-pixel window when used with a Macintosh Quadra. The VideoSpigot captures video in multiple sizes up to 320 x 240 resolution.

#4164 $375

4122.....VideoSpigot LC.....245
4114.....VideoSpigot Si.....275
4164.....VideoSpigot NuBus.....375
7679.....VideoSpigot & Sound.....489
7678.....VideoSpigot & Sound Pro.....1129
3691.....VideoSpigot Pro IIsi.....1039
7676.....VideoSpigot Pro NuBus.....1039

IntelliColor Display /20

20" Trinitron, color monitor with switch-on-the-fly resolution and color depth switching. Allows monitor changes to be controlled from the keyboard, and uses a multilingual interface. Works with built in video on Quadra and Centris. It comes with anti-glare treatment and a tilt and swivel base.

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12274....IntelliColor Display /20.....2799
1736.....Precisoion Color Display /20S.....2499

Spectrum 24 Series IV

High Quality, Low Price 24-bit Video Card

The Spectrum 24 Series IV is a 24-bit video card that has on-board QuickDraw acceleration which will speed up QuickDraw specific routines by up to 600%. Also included is hardware pan & zoom and a virtual desktop, dynamically sizable up to 4096 x 1536 pixels. This NuBus video card supports most displays.

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SuperMac 20" Color Displays

The 20" SuperMatch display uses a Hitachi tube and displays 1024 x 768 with a resolution of 72 dpi. It has a refresh rate of 75 Hz and anti-glare coating.

#1805 $1549

SuperMatch 20T XL display uses a Sony Trinitron CRT with a resolution of 1152 x 870. It has a vertical refresh rate of up to 85 Hz. It comes with a tilt and swivel base, and a "Smart Touch" front control panel.

#6380 $2649

Color-Page T16 II

16" 24-bit color monitor with a Sony Trinitron tube. It supports 4 resolutions from 640 x 480 to 1152 x 870 and has a refresh rate of up to 75 Hz. The screen has anti-glare coating.

E-Machines

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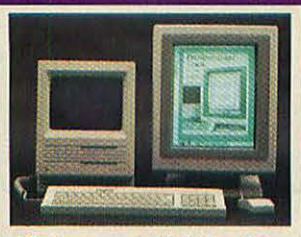

Nutmeg 15" Display

Nutmeg Systems offers a 15" black and white display for the Macintosh at a price that can't be beat. This 15" portrait monitor with video interface is available for the entire Macintosh II family, as well as Mac LC and Mac SE.

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SUPERMAC

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10147...1050 MB Pro Drive 5yr warranty.....1289
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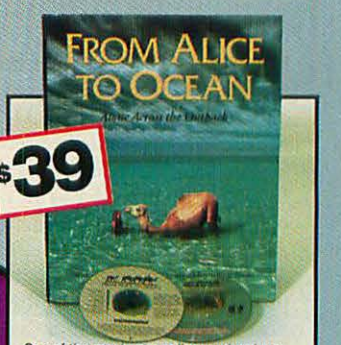

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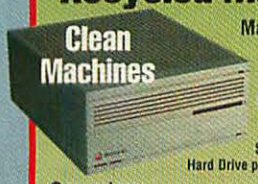

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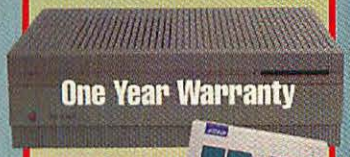

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3576 ..... FX9624V 24/96 S/R fax, V.42, V.42bis .. 127
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Space-Image Exploration

Amazing Universe 2.1

PROS: Huge collection of images; sophisticated image-editing software. **CONS:** Expects sophisticated users. **COMPANY:** Hopkins Technology (612/931-9376). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; CD-ROM drive; System 6.0.5. **LIST PRICE:** $79.95.

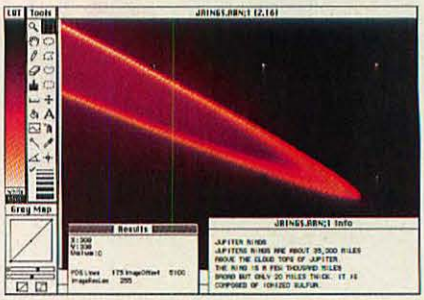
MW ★★★

EVERY NOW AND THEN, A PRODUCT lives up to its name. Amazing Universe is indeed amazing, mostly in positive ways. You get an amazing variety and quality of astronomical images, an amazingly competent program (ProVision II) for modifying and inspecting those images, and some amazing assumptions about users (for example, that you aren't fazed by the prospect of writing your own image-convolution matrix in a text editor).

Most users of Amazing Universe will probably content themselves with perusing the beautiful images. There are satellite and space-probe photos of Earth, the Moon, the Sun, and all the planets, as well as other visually intriguing space objects (possible black holes, galaxies, surface close-ups from lander probes). Since the CD contains 48MB of images, and each image takes only 80K or so of disk space, you can cruise the universe for hours without repeating any pictures, especially if you pause to effect a few psychedelic changes in the color lookup table on your favorite images (the rings of Jupiter are a nice choice).

The centerpiece of Amazing Universe is not the set of images, spectacular though they may be, but the application ProVision II. ProVision is in most respects a more powerful image-modification program than Adobe Photoshop, lacking only Photoshop's capabilities for image export to the real world of commercial four-color printing. Besides general-purpose image filtering, including custom convolutions, ProVision offers edge finding, particle analysis and image densitometry (with 3-D histograms of sampled image values), a sophisticated macro language, and a respectable range of image formats.

All these capabilities are listed, but certainly not explained, in 57 manual pages that discuss not only image capture from scanners and color video cameras but also the application of the program to electrophoresis gel analysis. This last topic is a standard procedure in analytical biochemistry, and the fine print in ProVision's About box reveals that the program is a repackaging of the celebrated program Images, by Wayne Rasband of the National Institutes of Health, provided by the Astronomical Research Network for this image-analysis context. As a piece of commercial software with proper documentation, ProVision would sell for about $695; if you already know something about image processing or are willing to experiment, it's an Amazing bargain.



Your Tax Dollars at Work The rings of Jupiter make a lovely display, in your choice of pseudo-natural lighting or imaginative variants of false color. These government-funded pictures in Amazing Universe are analyzed with another government-funded image-analysis program.

This program doesn't necessarily belong in every home, but if you have some interest in the rest of the universe, you can't beat Amazing Universe for price or features. Hopkins Technology is performing a real educational service by offering so much for so little.—CHARLES SEITER

Digital Circuit Simulator

CircuitMaker 3.0

PROS: Low price; macro capability; large component library. **CONS:** Doesn't support multiple monitors; can't output circuit netlist. **COMPANY:** MicroCode Engineering (801/226-4470). **REQUIRES:** Mac Plus; System 6.0. **LIST PRICE:** $200.

MW ★★★★

DIGITAL ENGINEERS SPEND A LOT OF time tediously diagraming circuits and constructing prototypes. CircuitMaker promises to relieve that tedium, by providing a circuit-drawing tool with a digital circuit simulator. The drawing tool lets you quickly lay out schematic diagrams with standard or custom components, and the digital simulator lets you validate the diagram without actually building a prototype. While other products offer these capabilities and more, their prices run to thousands of dollars. CircuitMaker provides a powerful set of basics for $200.

The package contains a single disk and a well-written, indexed manual. A tutorial, along with a half-dozen supplied experiments, makes up a minicourse in digital electronics.

You interact with CircuitMaker via a single scrollable window over a fixed-size, 48-inch-square drawing surface. A set of five menus gives you access to a large selection of standard circuit components, including switches, LEDs, seven-segment readouts, resistors, capacitors, diodes, transistors, and digital integrated circuits. After you select a component, it appears on the drawing, where you can position it as you wish. Various drawing tools let you lay down lines representing circuit paths; move, rotate, and rearrange components; and add annotating text. The wire tool provides a special long cursor to simplify aligning circuit paths and placing the closely routed parallel lines often found in digital designs.

CircuitMaker includes some advanced capabilities you wouldn't expect in a low-end product. You can encapsulate any circuit as a macro, shrinking a complex design into a black-box package for use in another circuit. You can also create your own symbols in a drawing package, and then add those symbols to CircuitMaker's library.

While CircuitMaker lets you make reasonably clean circuit diagrams, it really shines in the simulation phase. Pressing the Run button gives you four different views of the operation of the digital part of your circuit (analog components are ignored during simulation). First, a logic probe lets you observe the changing state of any single connection. Second, any LED displays connected to your circuit change state just as they would in real life. Third, you can tap into the circuit at any number of places to display signal waveforms in a scrolling chart window. Finally, a trace feature simultaneously displays the binary state of every circuit leg as black or gray.

You can print the circuit diagram and waveform display, or save them as PICT documents for export to other applications. You can't, unfortunately, output the circuit as a netlist—a standard format used for exchanging circuits between packages on DOS PCs and Macs. Such a capability would let you use your circuits in sophisticated circuit-analysis programs such as pSpice, or create the printed circuit-board layouts necessary for actually constructing prototypes. MicroCode says a future add-on will provide this capability. The only real glitches in an otherwise flawless product are some cosmetic screen-display bugs and the lack of support for multiple monitors.

If you're a professional engineer, CircuitMaker is useful even if you have access to high-end engineering software. CircuitMaker is much easier to use than pricier products, and for quick jobs you are likely to find it adequate. If you're a student or teacher, you'll find the ability to quickly design and test circuits makes this product a first-rate classroom aid.—MEL BECKMAN

Church-Management Software

Roll Call 2.0

PROS: Easy to learn and use. **CONS:** Some minor interface anomalies. **COMPANY:** By the Numbers (603/927-4508). **REQUIRES:** Mac Plus; 2MB of RAM; System 6.0.3; hard drive. **LIST PRICE:** $495.

MW ★★★

ROLL CALL IS A 4TH DIMENSION database application for churches. Just about any church can use this program to manage information about the individuals associated with the organization. The program also helps church officials track donations, attendance, church-group membership, and visitation.

When entering information about an individual, in addition to the usual name, address, and telephone number, you also specify the person's association with the church—whether the person is a member, nonmember, or visitor, or has some other relationship to the church. Roll Call also maintains other information, including the church groups people are involved in, the pledges they have made, and a record of visits made to them by the church. The program also stores important dates, such as birthdays and wedding anniversaries.

Roll Call uses the power of 4th Dimension to associate records for people who are members of the same family. This saves time, since it enables you to enter common information for the family (such as address and phone number) when the record for the head of the family is entered. Later when you add a record for another member of the family, you do not have to reenter the common information.

Some field values can be entered by using pop-up lists, check boxes, and radio buttons, making data entry easier. You can modify the values of several of the pop-up lists according to the needs of the church, and you can also define custom fields.

You can use Roll Call to record the attendance at three different meetings: morning, evening, or midweek. You record the total number in attendance, as well as the attendance of each person at a meeting. Roll Call also tracks Sunday-school enrollment and attendance.

You can use Roll Call to track the pledges that members make to the church, as well as actual donations.

Roll Call generates many kinds of reports. In addition to the large number of predefined reports the program offers, you can create and print custom reports, and you can preview the information on screen before committing to hard copy. Roll Call also prints mailing labels and donation receipts. The program allows you to do custom searching of the database.

In order to use the database, you must enter an authorized password. You use the Password Access editor to restrict access to the system by setting passwords and assigning one of four different levels of access to users. This is an important feature because access to confidential information, such as donations, can be restricted to church officials, while the general congregation can use the system to enroll in a Sunday-school class or other group.

Some aspects of the program could be improved. The Print Settings menu is known as Page Setup in other Macintosh programs. You also should be able to quit via ⌘-Q. There is no cancel button on the dialog box that comes up when you select Enter New People. The Roll Call title screen is always displayed but serves no function.

Overall, Roll Call is a good program that provides many functions to help churches. The basics of the program can be learned in less than an hour, and it comes with a decent manual and free technical support. While Roll Call is not touted as a do-it-all church-management system, it is a fine complement to a general accounting program that can handle more in-depth financial management.—STEVEN LEW

Job-Search Organizing Software

Achieving Your Career 1.02

PROS: Well-thought-out organizing tools; automatically posts contact data to calendar and to-do list. **CONS:** Can't enter recurring events in calendar; no documentation for new HyperCard users. **COMPANY:** Up Software (415/921-4691). **REQUIRES:** Mac SE; 2MB of RAM; hard drive; System 6.0.7. **LIST PRICE:** $69.

MW ★★★

FOR ALL BUT TRULY AUDACIOUS SELF-promoters, searching for work can be dispiriting and degrading. You begin to regard your home Mac with disgust—"If this thing is so smart and friendly, why doesn't it find me a job?" Achieving Your Career can't find you a job, but it does help the poor pilgrim keep slogging on. It provides a structure for identifying the letters you need to write, the phone calls you need to make, the interviews you need to follow up.

The program is built around four groups of tools. One has databases of companies and contacts, a calendar, and progress records. A second group contains résumés and cover letters that you can export to a word processor as templates and tailor to your needs. The third offers interactive exercises where disembodied voices engage you in interviewing, negotiating, and phone tag. Interviewers ask just why you think you can help them. After practicing your answer, you read on screen how to handle your responses. The fourth section contains relaxation exercises, tools for evaluating yourself and potential employers, and suggestions for learning from your experience.

The organizing tools are the best part of this program. The database helps you target the objects of your professional desires. It comes with 500 of the largest national companies already entered, and you can add companies according to industry, size, and region. This database is helpful for focusing on getting that critical thing for a job seeker—a friendly contact on the inside.

The contact list keeps track of everyone you deal with. Instead of shuffling business cards and scraps of paper with scribbled phone numbers, you enter the info in an address book, and the program maintains a history of your communications. The calendar displays your daily and weekly schedules. Frustratingly, though, it lacks a way to schedule recurring events so they appear every week. The progress tools help you track your accomplishments, define your goals, and budget time and money. This section includes a to-do list to track uncompleted tasks. The best feature of the progress section is that when you record information in one place—say, noting an upcoming meeting on a personal contact card—the information automatically posts to your calendar and to-do list.

When it moves from the practical to the motivational, Achieving Your Career gets a little superficial. A Learning section contains exercises designed to gauge how you view your own employability, your competition, and your prospective employers. Unfortunately, this is similar to a Scientology "personality test"—there's no junk mail, but no evaluation either. In the very silly relaxation exercise, when you click on a picture of a sleeping cat, it barks. Managing stress and emotions is important, but for this you're better off turning off the Mac and picking up a book. Fortunately, Achieving Your Career contains a useful bibliography on career development.

Two words of caution: If you've never worked in HyperCard before, the manual won't help you out. And make sure your résumés and cover letters don't repeat the manual's punctuation and spelling errors.

Even if you already know the color of your parachute and have a darn good résumé, Achieving Your Career can help you turn that clutter on your desk into the valuable, organized information you need to go to work to get a job.—STEVEN HANKS

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AppleShare administration averages $10,000 per year less than other systems, according to the Business Research Group (BRG) study "Lifecycle Costing for PC LAN Administration — A Comparative Analysis of 5 Leading NOS Environments." Environments compared were AppleShare, Banyan VINES, Novell Netware
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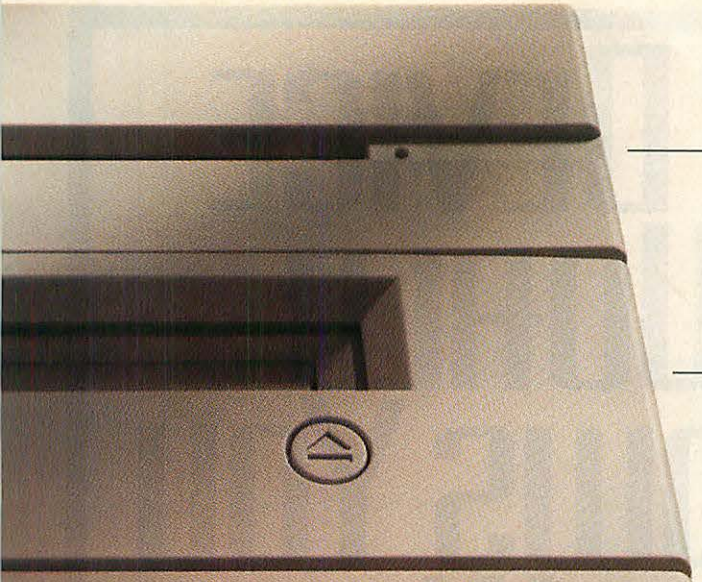

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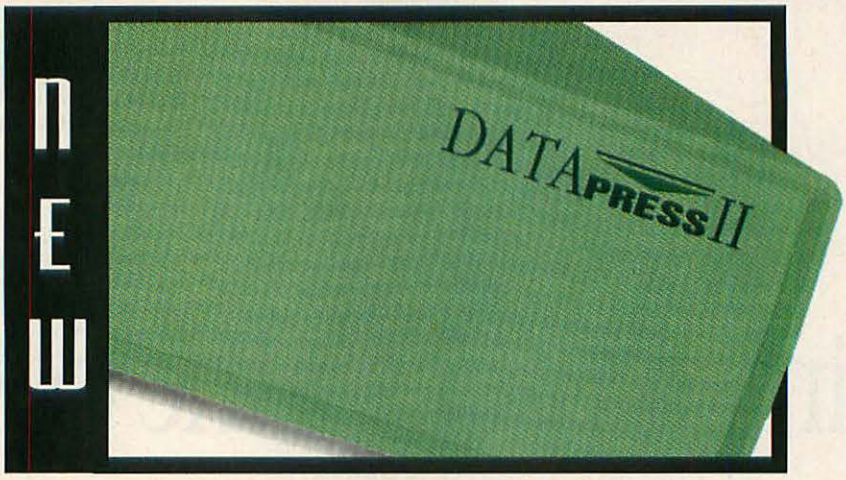

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Circle 135 on reader service card

Software for the Musically Impaired

BY DAVID POGUE

THAT THE MAC IS THE ULTIMATE musician's computer is no great secret. It records, plays, and orchestrates like a virtual virtuoso. But, it's also the ultimate *non*musician's computer. Whatever your skills, or lack of them, the Mac is a wonderful duet partner. It keeps time while you handle the melody, or carries the tune while you conduct. Imagine sounding terrific with neither a psychoacoustically designed performance space (the shower) nor alcoholically inspired chutzpah (karaoke).

Don't get scared off. We're not talking music education here. And we're not talking about baby games. We're talking pure musical fun for grown-ups who've never recovered from their music teachers' suggestion that they just mouth the words instead of singing them.

Rapmaster 1.0.1

IF THERE WERE A BEAUTY PAGEANT FOR noncommercial software, this knockout would be walking down the aisle with Vaselined teeth. Bryan "Beaker" Ressler has created an absolutely irresistible software boom box. One switch starts the booming funky bass line; another makes the happy hip-hop drum machine kick in. You even have your choice of rock style: House, Hard Rock, Latin, and so on.

Then, if you're not yet dancing, there's also a row of buttons to trigger handclaps, cowbell clanks, and orchestra hits. But the crown jewel is the Perry Como record. You grab your mouse and scritch-scratch across that virtual vinyl, and suddenly you're a rap artist. When inspiration strikes, you can use the Mac microphone (or a MacRecorder) to record a nine-second rhyming message of, say, political significance or unrequited love. Then, at the touch of an on-screen button, your rap is added to the mix. On a PowerBook, it's pure hilarity.

Online help, great graphics, a volume control that goes up to 11 . . . and it's *free.* Get it from America Online (it's in the Macworld forum), or send a disk and prestamped return envelope to Beaker at 4660 Persimmon Place, San Jose, CA 95129.

Jam Session 2.1

TAKE THE SIMPLE GOOFY JOY OF RAPmaster, add more instruments to the mix, throw in a variety of full-fledged songs, and you have Jam Session ($59.95; Bogas Productions, 415/592-5129). In this program, the latest incarnation of the classic, the songs are already composed for you. In fact, that's the best part: they're all hit pop songs, from "La Bamba" to "Sledgehammer." The great-sounding arrangements play through your Mac speaker; on the screen, you see a picture of a rock band whose players twitch in time to the sounds of their respective instruments.

While the performance is going on, you press keys on your keyboard. Each key triggers a guaranteed-to-sound-right solo or lick. You can change the tempo without affecting the pitch. Amazingly, you can even edit the little licks, using standard music notation.

The only downside is that the novelty wear-off factor is higher in this program than in others. For example, there are only 5 different visuals to watch during the 30 songs you get with the program. (You get 20 songs when you buy, and 10 when you send in your registration. You can also spend $19.95 for the Classic Songs disk set of another 10 songs and 2 visuals of higher visual and sonic quality.)

Instant Pleasure Music 1.1

HAVE YOU EVER SEEN A SIX-YEAR-old bang on the piano keys, blissfully unaware that the resulting music won't win any Grammys? Now imagine that the same random banging produced the beautifully played, fully formed chords of a familiar song.

That's the idea behind the delightfully oddball Instant Pleasure ($149; Instant Pleasure, 614/297-7600). It requires a MIDI keyboard (a synthesizer) connected to your Mac. You load a folk song of your choice (you get 25 with the program, and additional song disks for about $15 each). Then you make the notes of the song play by successively pressing *any* keys on your synthesizer or Mac keyboard. Yes, it's as weird as it sounds; essentially, you tap random keys in the *rhythm* you want. With each bang, you hear the next correctly played note or chord from your Mac speaker. (If you have a MIDI synthesizer hooked to your Mac, get the Instant Pleasure MIDI version. It lets you play random keys on your *musical* keyboard to trigger the chords—the harder you play, the louder the chord.)

You get a screen of bouncing-ball lyrics to follow, and it's a snap to change the key; and you can make the program play all by itself. Still, I can't for the life of me figure out what you'd do with this pricey thing. Conduct sing-alongs, I guess.

Let the Mac's musical gifts help yours along

So You Want to be a Rock and Roll Star

TWO MONTHS AGO I COMPLAINED, IN this column, that not enough people are making clever use of the world's largest floppy disk, the CD-ROM. Interactive Records (415/285-8650) has done something about it. So You Want to be a Rock and Roll Star ($99.95), despite its dumb name, is an extremely creative and enjoyable disc. It contains six vintage pop songs: "Crazy," "Runaway," "Stand By Me," and so on. Using a stereo or headphones connected to your CD-ROM player, you listen to a professional recording of the song. While the song plays, you can watch one of three displays: the sheet music scrolling by; a series of still-frame paintings that tell a rock-videoesque story; or a theoretical graph of the song. A nicely done QuickTime movie tells the history of each song and singer.

The great part is, though, that you can turn off the singer, the piano player, or the guitarist. The rest of the band keeps playing, so that you can fill in, on your own piano, guitar, or imaginary microphone, for the part you've silenced.

Alas, the program nukes your Apple menu, and it's slow

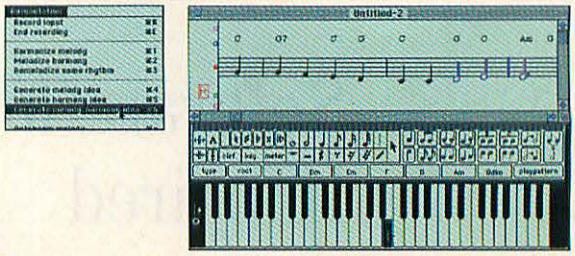
continues

(that's CD-ROM for you), and I doubt you'll get much from the theory lessons. ("Natural minor scale: a scale that starts down a minor third from the tonic of the relative major." Thanks *mucho.*) Nonetheless, the on-screen how-you-play-it guitar and piano lessons are excellent. An absolute beginner learning to stumble through a song or two along with the disc-based band is perfectly conceivable. (My guess, however, is that you'll need somewhat more than this disc—a funny haircut and a marketing firm, perhaps—to reach rock-'n'-roll-star status.)

Band in a Box 5.06

BAND IN A BOX IS AN UNPUBLICIZED, grass-roots hit among Mac, IBM, and Atari musicians ($88; PG Music, 416/528-2368). It's drastically more complicated than anything else reviewed here—the badly edited manual is nearly impenetrable. You have to know enough about music to type chord symbols onto the screen (Cmaj7, G7, and so on). You also have to own a synthesizer and a MIDI interface to connect it to your Mac.

If you meet those qualifications, though, Band in a Box is an astounding piece of work. It plays the song you've sketched out in any of hundreds of musical styles, playing your synthesizer's bass, drums, piano, and guitar sounds in a fresh and professional way. And it comes with nearly 300 ready-to-go songs, from today's pop hits to golden very-oldies—and a choice of 115 musical styles, if you can believe that. You haven't lived until you've heard "As Time Goes By" played as a cha-cha.



The Works The heart of Songworks is its Autonotation menu (left). Autonotation makes the computer compose a tune, or make up chord symbols, or both. It can also write out a single-line melody that you plunk out on your Macintosh keyboard or MIDI synthesizer.

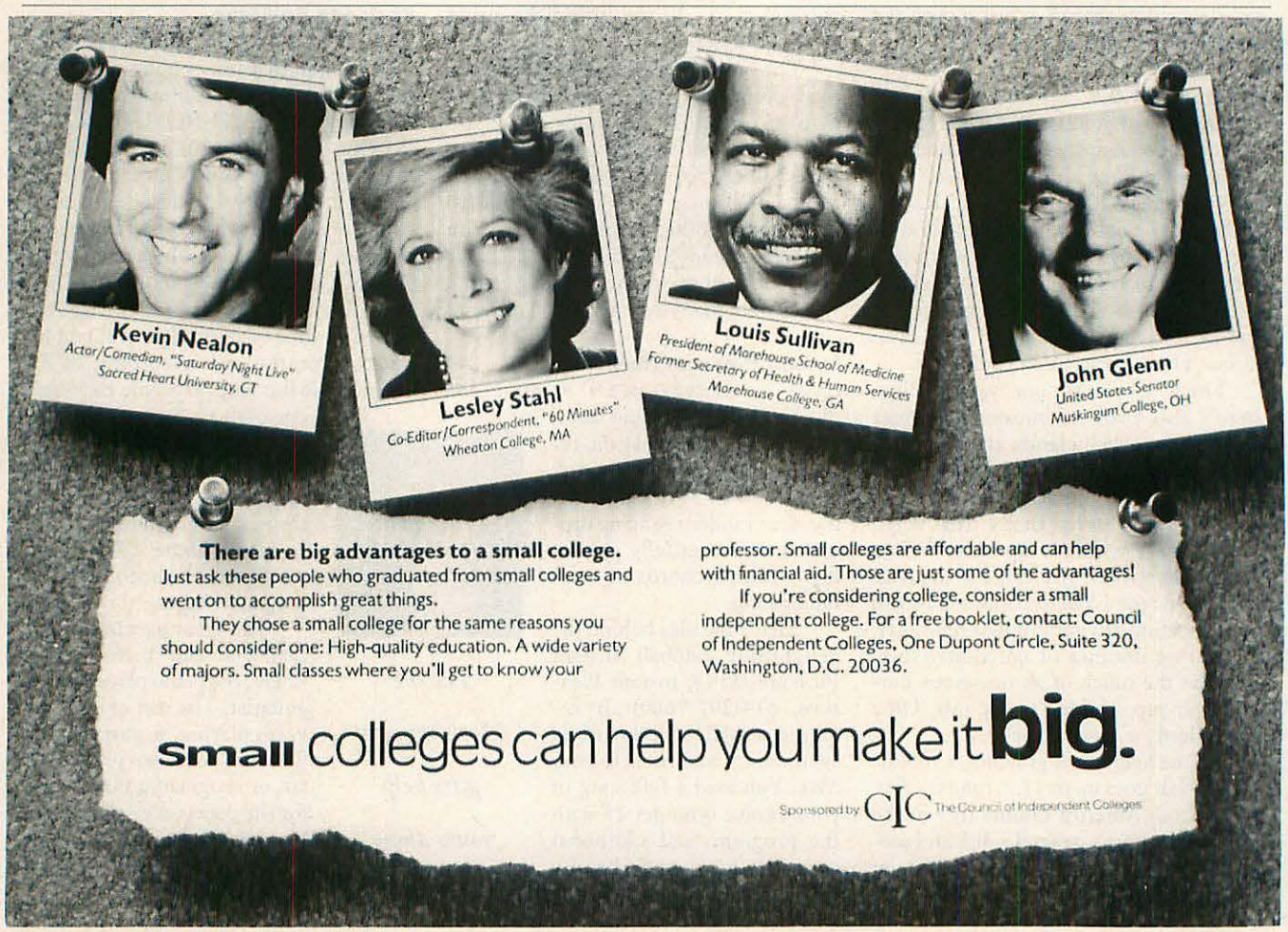
You can use Band in a Box as a backup group for practicing; to try out arrangements; to study different playing and orchestration styles; or to save as a MIDI file that you can open in a sequencer or notation program.

MiBAC Jazz 1.5.8

MIBAC JAZZ IS BAND IN A BOX'S HIPper, less versatile, more serious cousin ($125; MiBAC Music Software, 507/645-5851). This one, too, requires you to hook up a MIDI keyboard and type chord symbols into an empty lead sheet. And here, too, your accompaniment is played by an electronic band. But this time, it's all jazz.

The program's snazzy improvisations aren't as richly orchestrated as Band in a Box's—MiBAC offers bass, drums, and piano only. Nor are they as flexible: you get only four swing styles. There are no ready-made songs to play, you can type in only two different chords per measure, and you can't record a melody (as you can in Band in a Box).

But those differences all spring from MiBAC's impressive dedication to its cause: helping you develop, play, and print jazz lead sheets with as much flexibility and efficiency as possible. The program handles the comping (improvised accompaniment) and transposing (to print a lead



sheet, for a trumpet player, say). MiBAC is dramatically easier to use, too; its manual and interface are all-Mac, all-readable, all-nice. I suppose MiBAC Jazz isn't as much sheer fun as Band in a Box. But especially in light of MiBAC's song-structuring features and its superb printing options, it may be better suited for players, teachers, arrangers, and jazz fans of any ilk.

Songworks 1.2.8

WHAT DO YOU GET WHEN YOU CROSS A one-finger-accompaniment Casio keyboard with a tape recorder and a piece of sheet music? Songworks ($125; Ars Nova Software, 206/889-0927). You can actually play your Macintosh keyboard as though the keys were piano keys—why hasn't anyone ever thought of this before?—and the program writes out what you're playing on a single staff. You can only play single notes—no chords, and nothing fancy. (You can also use a MIDI keyboard, if you have one.)

Of course, you can play the melody back, type in lyrics, transpose to a new key, and even print out your lead sheet. But the real fun begins with the Autonotation menu. Choose Harmonize Melody, and Songworks makes up, writes in, and even plays back the chords that fit your doodled melody. (You can specify how the chords play back, from *oom-pah* two-steps to rolling broken chords.) Incredibly, there's also a Melodize Harmony command: the program composes its own new melody to fit the chord symbols that are already there. The program can even make up a new song of its own, tune and chords. (Its compositions are simple and usually forgettable. But every now and then it surprises you.)

Songworks holds enough unexpected lessons and instant gratification that it ought to get a rave review—if it weren't for the few remaining bugs. The author promises to get it right, and send the new version(s) free to all registered users.

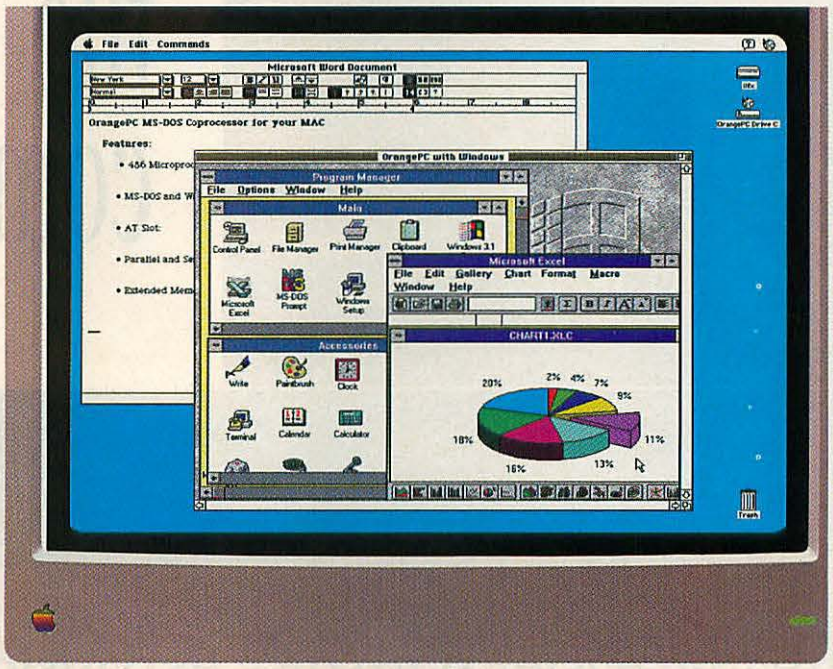
The Upshot

THESE PROGRAMS ARE TOO DISSIMILAR for me to recommend one above all the others. But it'd be hard to go wrong with Rapmaster (for the musically destitute), Songworks (for the dabbler), or Band in a Box (if you know chord theory). As a matter of fact, I used my Mac microphone to make short recordings of all three, and I've put the resulting sound files on America Online, in the Macworld area, so you can hear what you're getting into.

Don't tell my editors, but I had so much fun playing with these products that I would've written this month's column for free. Armed with any of these programs, you can tell your friends that you really know how to make your Mac sing—and mean it. **m**

The Master Beaker Ressler's enchanting Rapmaster is one of the most polished programs you've ever gotten for free.

Contributing editor DAVID POGUE is the author of the Mac novel *Hard Drive* (Berkley Books, 1993). He's a musician in New York, where he's a consultant for such Broadway composers as Stephen Sondheim, John Kander, and Cy Coleman.



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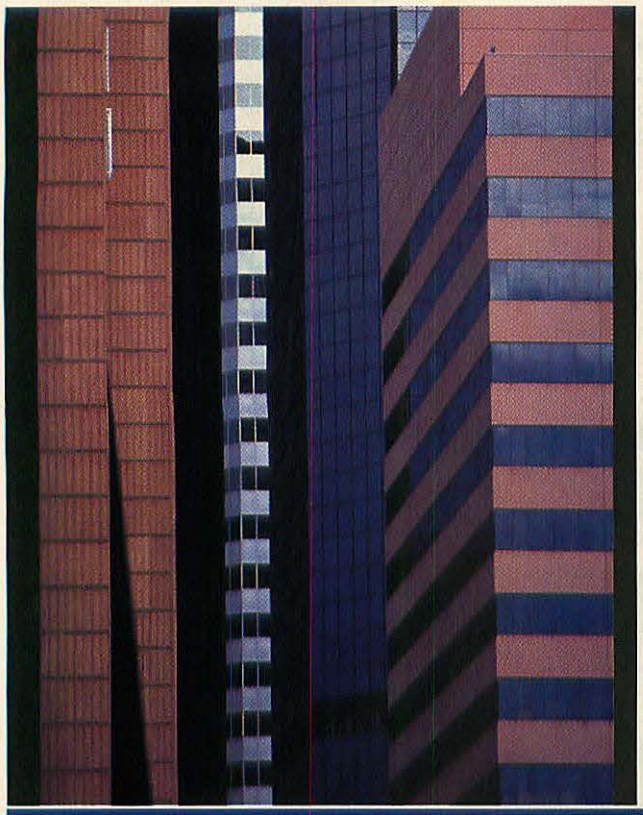

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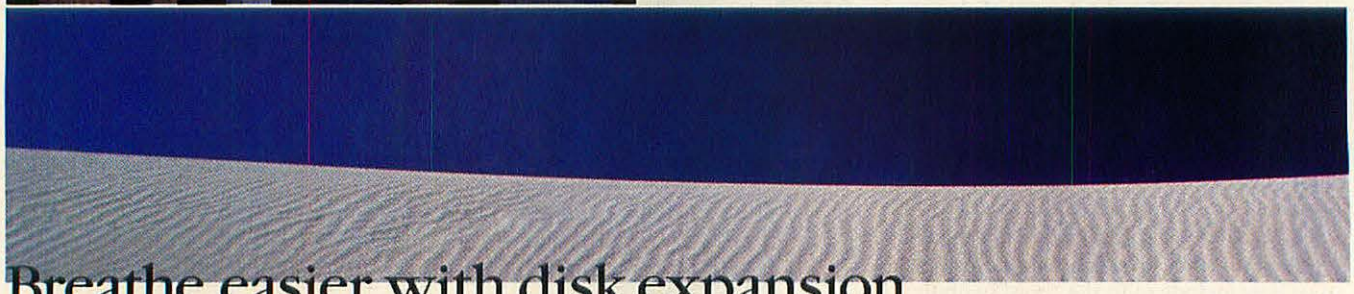

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	eDisk	TimesTwo	Stacker
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Alysis is a leading company in Macintosh compression products. Other Alysis Products include **More Disk Space** and **SuperDisk!** We provide full compatibility with all Macintosh Software for your Quadra or Centris with our **Compatibility Init**.

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New Products

The Latest Macintosh Releases

EDITED BY CAMERON CROTTY

THIS SECTION COVERS MACINTOSH PRODUCTS FORMALLY ANNOUNCED BUT NOT YET EVALUATED BY *MACWORLD*. UNLESS OTHERWISE STATED, THE MINIMUM REQUIREMENTS FOR OPERATION ARE A MAC PLUS, WITH 1MB OF RAM, RUNNING SYSTEM 6. ALL INFORMATION AND PERFORMANCE CLAIMS ARE SUPPLIED BY THE PRODUCT VENDOR AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY *MACWORLD*. ALL PRICES ARE SUGGESTED RETAIL. PLEASE CALL VENDORS FOR INFORMATION ON AVAILABILITY.

HARDWARE

20" Professional Series II Monitor
If only we could hook this baby up to our cable boxes for the NFL preseason games. This 20-inch monitor features a Trinitron tube with a .31mm aperture pitch; a 76Hz refresh rate at 1024 by 768 resolution; and an LCD control panel for adjusting image size, convergence, contrast, brightness, and color temperature. The monitor meets the Swedish MPR II emissions guidelines. $2749. Epson America, 310/782-0770, 800/922-8911; fax 310/782-5179.

AVR 8800/CLX
This high-resolution flatbed scanner scans reflective materials in either gray scale or 24-bit color at 800-dpi optical resolution. The scanner handles materials up to 8½ by 11 inches, comes bundled with Adobe Photoshop, and is TWAIN compatible. The unit can be upgraded to handle transparent originals. $1700. AVR, 408/434-1115; fax 408/434-0968.

CrayonFX
This QuickDraw, color, thermal-wax printer prints 203 dpi on 8½-by-11-inch paper at roughly 2½ minutes per page. The printer uses either three or four color ribbons that provide 115 or 80 prints per roll, respectively. A monochrome ribbon is also available. The printer ships with 50 TrueType fonts. $1495. LaserMaster Corp., 612/944-9330, 800/950-6868; fax 612/944-0522.

CrayonFX

FotoMan Plus
The new version of this portable digital camera features a larger main lens (65mm), longer battery life (over 100 hours), improved automatic flash control, faster downloading of stored pictures, and a 67 percent increase in resolution. Users can take black-and-white digital pictures and then download them to the Mac for editing or printing. $799. Logitech, 510/795-8500, 800/231-7717; fax 510/792-8901.

FotoMan Plus

hammerCD
Calling a CD-ROM drive speedy is a bit like calling sugarcoated breakfast cereal nutritious. Still, this double-speed CD-ROM drive features a SCSI-2 interface, ships with FWB's CD ROM Toolkit utility software, and is multisession Photo CD–compatible. $959. FWB, 415/474-8055; fax 415/775-2125.

Lazer Link III
Forget Congress—you can build your own data superhighway with this fiber-optic SCSI bus extender. A host unit plugs into the SCSI bus and transmits all data and commands over a fiber-optic cable up to 1km long. At the other end, a remote unit decodes the data and spits it out through a standard 50-pin SCSI port. The product does not require a SCSI bus address and is completely transparent to devices on the bus. $1695 per unit. Applied Concepts, 619/453-0090, 800/624-6808; fax 619/453-6715.

LFR Mark II
This SCSI digital film recorder records 35mm slides at 2000- or 4000-line resolution with up to 36-bit color; features a 16-character status display. Output times are 25 seconds for 2000-line images and 40 seconds for 4000-line images (doesn't include rasterizing time). $14,995. Lasergraphics, 714/727-2651, 800/727-2655; fax 714/727-2653.

M3907G
Got tons of paper to scan? How does 40 pages per minute sound? This monochrome, flatbed, SCSI scanner handles reflective originals up to 11 by 17 inches. The 100-page document-feed attachment comes standard. $11,995. Fujitsu Computer Products, 408/432-6333, 800/626-4686; fax 408/894-1706.

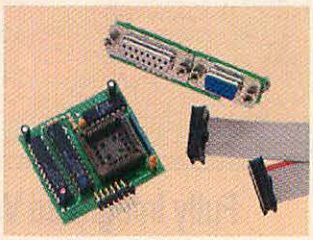
MobileWriterPS
A portable PostScript PowerBook printer for portable people, this 6-ppm, 300-dpi, thermal-transfer unit emulates a LaserWriter IINT. The MobileWriterPS features the Microsoft version of PostScript, 35 fonts, support for TrueType, 2MB of RAM, and HP PCL4 emulation. The product connects to the Mac via an AppleTalk interface, and also includes a Centronics parallel port. $999. Mannesmann Tally, 206/251-5653; fax 206/251-5520.

OL830 Plus/OL850LED Page Printer
The OL850LED 8-ppm printer ships with 65 on-board fonts, an AppleTalk interface, and 2MB of RAM (expandable to 4MB); the printer supports PostScript and HP PCL 5. The OL830 Plus uses the same 8-ppm print engine, includes 33 fonts, and supports PostScript and PCL 5, but does not ship with an AppleTalk interface (the interface is available as an option). OL830 Plus $1799; OL850LED $1999. Okidata, 609/235-2600, 800/655-3282; fax 609/778-4184.

powerbox

powerbox
This product features 200MB or 500MB of floptical storage in a case that fits underneath a PowerBook. The unit weighs less than 5 pounds and draws power from its own PowerBook battery or an included AC adapter. 200-f $1449; 500-f $2399. adambyte, 415/988-1415; fax 415/988-1418.

PowerR Model CC-10
This adapter clips onto a Color Classic's logic board and provides a video-out port for a color LCD display panel. Other models are available for other Macs. $129. PowerR, 206/547-8000, 800/729-6970; fax 206/285-0260.


PowerR Model CC-10

Pro Imager 7650C
If your idea of a hot time on the old town is scanning 11-by-17-inch reflective originals in 24-bit color at 1200 dpi (optical resolution), read on. This flatbed, three-pass scanner ships with PixelCraft's QuickScan scanning software and ColorAccess software for professional color correction and separation. $11,495. PixelCraft, 510/562-2480, 800/933-0330; fax 510/562-6451.

SCSI-Net
A configurable SCSI hub that allows up to six Macs to share a single SCSI device. Ships with a driver that installs on the shared device and provides password-protected partitions. Included SCSI-Net monitor software (50K) runs in the background of each machine, managing read-write operations and updating shared-volume information at user-defined intervals. The connection cables can be up to 5m long, or up to 25m long using a differential protocol (which requires a converter box or SCSI-2 accelerator board in the sharing Macintosh). The product can be configured either with two single-ended and four differential ports or with six single-ended ports. Requires System 7. $5995. Transoft, 805/963-7181, 800/949-6463; fax 805/963-7178.

SK-Net FDDI NB
If you've got a NuBus slot, you can go fiber-optic. Provided, that is, you have a network to connect to. These FDDI network interfaces are FDDITalk, MacTCP, and AppleShare compatible. The SK-5441 is for connecting to fiber-based networks, and the SK-5461 connects to copper-based networks. SK-5441 $2250;
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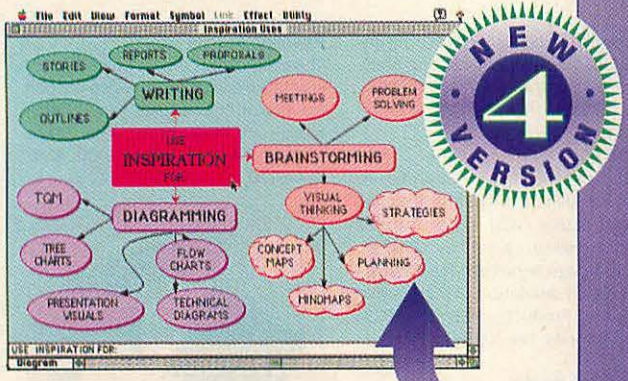

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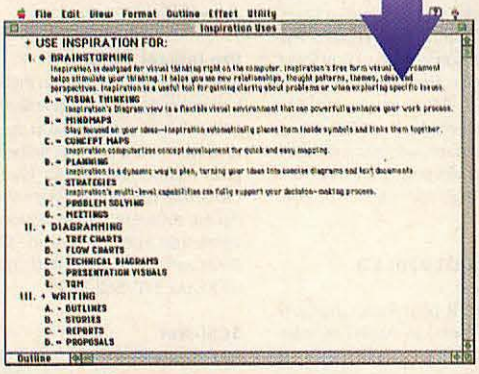

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Circle 104 on reader service card

SK-5461 $1950. SysKonnect, 408/725-4650; fax 408/725-4654.

SmartKit
Deep inside every off-the-shelf consumer, there's a do-it-yourselfer aching to come out. This product lets you take your old 3½-inch hard drives, put them inside SmartModules, and make them part of a SmartStack. The product accepts most 3½-inch mechanisms. An assembled SmartModule or SmartStack requires a SmartSource power supply (sold separately for $199) to operate. $99. Envisio, 612/628-6288; fax 612/633-1083.

VideoLinx PTV Mac
This device converts Mac video output to standard NTSC signals for presentation or recording. The box plugs in between a Mac and its monitor and includes an additional video-in port for genlocking animation or titles onto existing video footage. The product also includes controls for flicker reduction and hue and black-level adjustment. $795. VideoLinx, 408/395-9593, 800/245-0930; fax 408/395-9594.

ViewSonic 17
A 17-inch monitor with a .28mm dot pitch and a 76Hz refresh rate at 1280 by 1024 pixels. The product features built-in color control, moiré tuning, and video-input voltage adjustments. The product meets the Swedish MPR II emission guidelines. $1599. ViewSonic, 909/869-7976, 800/888-8583; fax 909/869-7958.

SOFTWARE

Adding Machine
This Calculator replacement features memory keys; a user-definable key that automatically calculates a set percentage, types a double-zero, or does standard addition; a paper-tape record that users can open and save; decimal point and rounding switches; and adding-machine sound effects. $49.95. Kensington Microware, 415/572-2700, 800/535-4242; fax 415/572-9675.

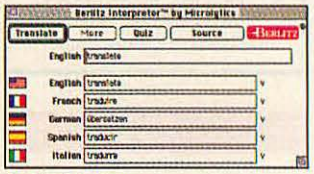
Additional Effects
This plug-in pack of special effects for CoSA's After Effects includes a Bevel Edges effect, drop shadow creation, Ripple, Blend, Brush Strokes, Twirl, and Unmultiply. Free to registered After Effects owners. CoSA, 401/831-2672; fax 401/274-7517.

Art-Scan 3.0
"Have scanner, will travel." This Photoshop plug-in allows users to scan directly into Adobe Illustrator or EPS files and can automatically scale images to the desired size, sharpen them, descreen them, or rotate them to correct for improperly aligned originals. $395. DPI Electronic Imaging, 513/231-1231, 800/597-3837; fax 513/231-5618.

Art-Scan 3.0

A-Train Construction Set
Once you've completed continental railroad domination, what's left to do except fiddle with your simulated world in godlike fashion? With the Construction Set, you can create cities from scratch, amass fortunes at the click of a mouse, sculpt the landscape, create impossibly complex mazes of track, or even assign assets to your computerized competitors for an extra challenge. $34.95. Maxis, 510/254-9700; fax 510/253-3736.

Berlitz Interpreter
If your international business takes you to Europe, this package has you covered. The software immediately translates typed words into four other languages and annotates the part of speech. The product features over 60,000 words in five languages: English, Spanish, French, Italian, and German. $49.95. Microlytics, 716/248-9150; fax 716/248-3868.



Berlitz Interpreter

ColorAccess
Color-separation software allows users to perform color correction, and select the gray balance and dot gain for individual production systems. The product features an on-screen densitometer, settings templates, unsharp masking, black-plate generation, and editable tone and cast settings. 8MB min. memory; requires Mac II. $695. PixelCraft, 510/562-2480, 800/933-0330; fax 510/562-6451.

FileRunner
If you've got too many files on your hands, or too many hands on your files, you might want to check this file-synchronization tool. The product allows users to synchronize any number of Macs, compensates for time zone changes, creates a complete log of all transfers, and automatically scans for viruses during transfers using DataWatch's Virex. $99.95. MBS Technologies, 412/941-9076; fax 412/941-7076.

Harbor Master 2.0
Surf's up, dude. This package uses the harmonic method to predict tides and tidal currents throughout a three-year period, so you can boogie out of work just in time to catch perfect sets. Or, if you depend on the tide for your work, you might find this package useful. The product displays data in several formats, shows the moon phase, shows sunrise and sunset times, and annotates high- and low-tide times and heights, as well as the time and speed for tidal ebb and flow. $150. Zihua, 408/372-0155, 800/659-0155; no fax.

continues

At first glance, most Macintosh storage solutions all seem the same. So why is it that editors and analysts so frequently select Mirror drives as best of category or Editors' Choice?

Details Make The Difference

We like to believe it has a lot to do with our attention to detail. Details that define our products' look, feel, operation, and serviceability. Since entering the Macintosh drive market in 1985, Mirror has continually refined and enhanced our products to better address real-world applications. And the editors recognize this.

Exclusive Software

All Mirror hard drives are equipped with the fastest mechanisms and come with Media Manager, our exclusive software, to format, partition, and password protect your precious data. And Soft-Backup to make backing up truly effortless.

Mirror products are consistently awarded top honors by industry experts.

Protect Your Data

You don't have to look far to find a cheaper drive. But since your data is more valuable than any drive you might select, we choose not to compromise.

Each drive is meticulously assembled, tested, and inspected, using only the fastest mechanisms, and backed by the most competent technical support in the business.

WHY SO MANY AWARDS?

Mirror drives are available from 85Mb to 1.37Gb, and include a free copy** of 7th Heaven utilities ($99 value).
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NEW! 3.5″ SyQuest drive stores 105Mb of data on a pocket-sized cartridge. With speed that rivals the fastest hard drives! **$699** ▶

Mirror SyQuest drives are a best buy. 44 or 88Mb models, or a version that reads & writes *both* 44 & 88Mb cartridges.
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Optical drive stores 128Mb on a 3.5″ disk. At less than 50¢/Mb, optical cartridges are perfect for large files.
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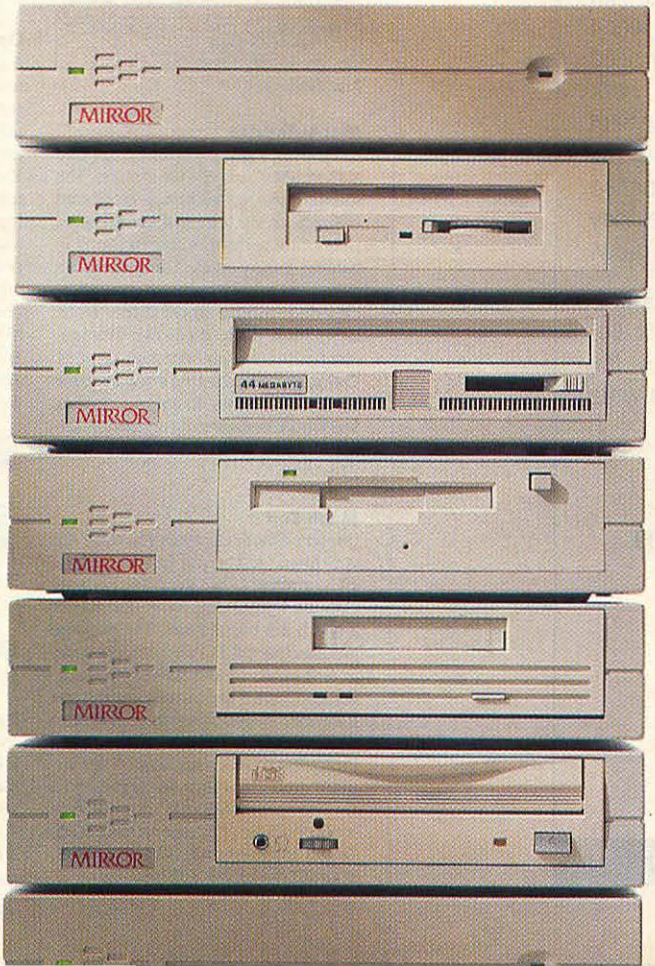
High-speed, low-cost back-ups on 2Gb DAT tapes. Now includes Retrospect ($199 value). **$1399** ▶

NEW! Rated best of CD-ROM category by MacUser magazine. *Now* dual speed & multi-session PhotoCD® compatible. Plays audio CDs too! **$649** ▶



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85Mb drive	$299	$249
127Mb drive	$339	$289
170Mb drive	$369	$319
240Mb drive	$479	$429
525Mb drive	$1049	$999
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SyQuest 44	$399*	
SyQuest 88	$499*	
SyQuest 88C	$599*	
105Mb SyQuest	$699*	
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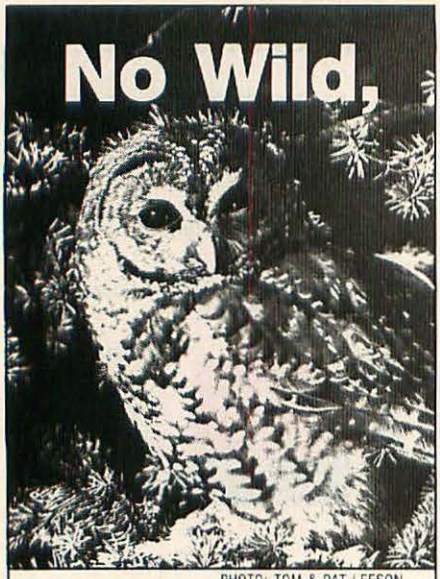
Circle 184 on reader service card



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No Wildlife.

Life in the wild can be pretty tough these days. Without the necessary ancient-forest habitat to live in, some species like the northern spotted owl of the Pacific Northwest are severely threatened.

At the Sierra Club, we believe that these owls and the ancient forest ecosystems they depend on need our help. The Sierra Club's work to permanently protect our ancient forests also helps preserve the habitat of the northern spotted owl, giving them the range they need to help their population grow.

To learn more about our work protecting the forest habitats of endangered species such as the northern spotted owl, please write us at:

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San Francisco, CA 94109
(415) 776-2211

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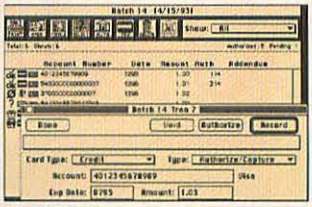
Helix Tracker
A workgroup workflow workpackage for your workMac. Industry doublespeak aside, this package allows users to send tasks (which consist of documents, instructions, and due dates) to other users in a group. When one person finishes working on a task, Helix Tracker automatically sends the task to the next person assigned to work on it. Users may also return tasks back to the previous person if more work is required. The product tracks status and location of tasks, saves and tracks each new version of a document, and provides a storage area to archive both public and private documents. 1.2MB min. memory; requires LocalTalk, hard drive. Server and four clients $739; additional clients $199 each. Helix Technologies, 708/205-1669; fax 708/291-7091.

InTouch 2.0 Network
Client-server version of company's contact-management software. InTouch server makes any designated InTouch file available to all users on the network. Server includes record-locking capabilities and two levels of password protection. Included utility, Snap, lets users print envelopes or labels directly from a word processor without launching InTouch. Three-pack $249.95; ten-pack $629. Advanced Software, 408/733-0745, 800/346-5392; fax 408/733-2335.



MacAuthorize

MacAuthorize
So much for those goofy little credit card authorization pads you see in stores. This software package authorizes credit card transactions via authorization agencies. Users can perform authorizations in batches or individually. Transactions are stored and may be reviewed, printed, or exported to other applications. Note: Users must make their own arrangements with credit-authorization agencies. Company customizes the software to the user's credit agency. Requires a modem. $195 to $400, depending on agency. Tellan Software, 408/274-1110; fax 408/274-1110.

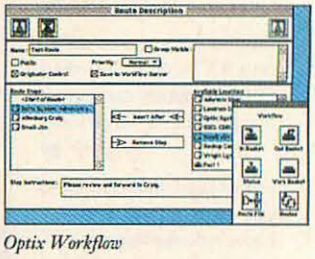
Mach Ten
Does the Mac Finder leave you cold? Are your fingers just aching for the comforting warmth of Unix? Mach Ten Personal Unix is a 4.3BSD Unix environment with a Mach 2.5 microkernel. The package includes the full TCP/IP protocol suite, as well as UUCP and SLIP communications, NFS client and server software, and a software-development tool-set with an ANSI-standard C compiler. Mach Ten Professional Unix adds support for virtual memory, a source debugger, and a C++ compiler. 4MB min. memory. Personal Unix $495; Professional Unix $695. Tenon Intersystems, 805/963-6983, 800/662-2410; fax 805/962-8202.

NetSecure
A chain is only as strong as its weakest link, and your data is only as secure as your network. NetSecure might help you beef up your weak links with password-controlled access to protected folders, optional DES data encryption, and AppleTalk Remote Access compatibility. Additionally, passwords never travel through the network, rendering wiretapping and network peeking ineffectual. Three-pack $249.95; ten-pack $629. usrEZ Software, 206/672-5387; fax 206/778-7146.

NovaLink Professional 3.0
This customizable server software allows users to set up bulletin board services, including electronic mail, public file areas, message forums, and real-time teleconferencing. Clients can access the server via serial modem. AppleTalk, the Mac Communications Toolbox, X.25, and TCP/IP access are available as separate options. The package features a graphic interface for server design and the ability to link multiple NovaLink servers. 4MB min. memory; requires System 7. $300. ResNova, 714/379-9000; fax 714/379-9014.

OCSG/Kerberos
Security software that supports both version 4 and 5 of the MIT Kerberos protocol. The software includes client utilities for requesting tickets, listing and destroying tickets, and changing a password. The product also supports fully encrypted remote log-in with VT100 terminal emulation and remote copy commands, using MacTCP. $95. Open Computing Security Group, 206/883-8721; fax 206/882-3489.

Optix Workflow
A package that allows businesses to move electronic documents along a user-definable routing path. This product ties into the company's suite of workgroup products that cover document imaging, text search, OCR, archiving and retrieving, and fax serving. The product features parallel routing and options for reuniting parallel processes. Entry-level price includes software, installation, training and support, server hardware, and one workstation. 8MB min. memory; requires Mac LC and 14-inch monitor. Entry-level system $75,000. Blueridge Technologies, 703/675-3015; fax 703/675-3130.



Optix Workflow

PathWay Messaging
Mac version of Messenger is a standalone E-mail client for exchanging messages with a Wollongong Group server or TCP/IP host (requires Mac TCP/IP 1.1). Messages can include text and encoded binary attachments (doc-

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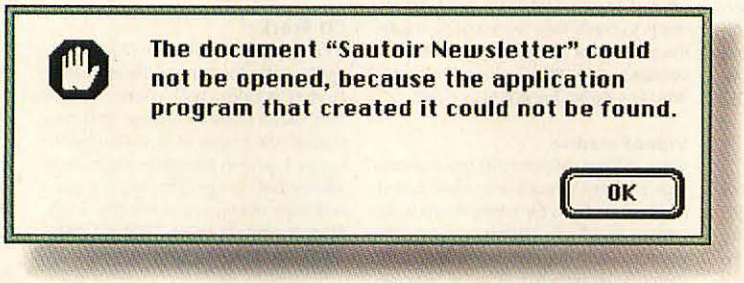

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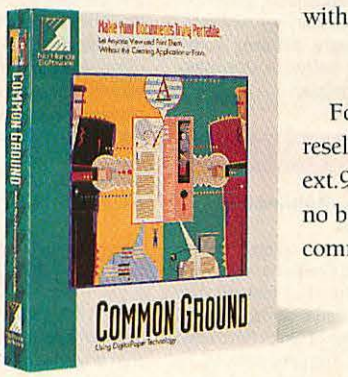

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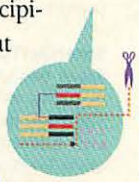

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Circle 27 on reader service card

uments, graphics, and so on). 4MB min. memory; requires Mac II. $195. Wollongong Group, 415/962-7100; fax 415/969-5547.

Pathworks
Client software includes a receiver for incoming system and mail messages, terminal emulation, and X Window display capabilities. The product also includes the AppleTalk for OpenVMS and DECnet for Macintosh network transports, which enable clients to share information with DOS, Windows, OS/2, OpenVMS, and Unix users. 2MB min. memory. $308. Digital Equipment Corp., 800/344-4825; no fax.

PowerPrint/NW
A set of Chooser-level drivers that allow Macs to share and print to PC-compatible printers over a Novell NetWare network. Drivers offer control over individual printer features, including image resolution, paper bins and trays, and double-sided printing. Up to 50 users $499. GDT Softworks, 604/291-9121; fax 604/291-9689.

Power to Go
When you're on the road, this set of utilities might help keep you from singing the Low Power Blues (made famous by Sonny Boy "ain't got no juice" Johnson). All modules are integrated into a central control panel with a slider bar for setting overall power consumption. Advanced users can tweak the individual settings. Features include a power gauge, customizable security, an animated cursor locator, automatic screen saving, sleep settings, and more. $89. Claris, 408/727-8227, 800/325-2747; no fax.

ScanMatch 2.0
This version of the scanner-calibration software supports both transparent and reflective media scanners, improves color-matching fidelity, and provides support for Apple's ColorSync. Users scan the included calibration target, and the software creates a ColorSync scanner profile, which is then used to optimize future scans. $199. Savitar, 415/243-3030; fax 415/243-3080.

SmartJetTools
Set of two utilities that provide direct output to an Iris SmartJet from a Mac. The Photoshop Export Module allows export directly from Photoshop instead of via PostScript interpreter, as well as color correction via Iris Graphics color models. FotoFinish is a stand-alone application that prints continuous-tone files directly to a SmartJet. FotoFinish supports Photo CD files, Scitex CT files, SmartV.I.P. files, or files from the Photoshop Export Module. FotoFinish also provides tools for creating enlargements, rotating images, and color-correcting them. $500. Iris Graphics, 617/276-5383, 800/947-4712; fax 617/275-8590.

TCP/Connect II 1.1
A client-server package that allows users to connect to any TCP/IP network via their server. The new version of the software features faster terminal emulation, mail archiving, ⌘-*key* equivalents, better mail and news handling, and a more stable server. 2MB min. memory. $195 to 495. Intercon Systems Corp., 703/709-9890; fax 703/709-9896.

Toner Tuner
If you're trying to tread lightly on the earth, not to mention your supplies budget, here's a possible environment and money saver. This System extension adds a control to the Print dialog box that allows users to adjust the darkness of printed copies. Users can print lighter drafts to check their work and then turn the toner back up when they need final versions. $49.95. Working Software, 408/423-5696; fax 408/423-5699.

VideoParadise
Video-editing software that takes advantage of Sony Vdeck's time-code–based architecture. Users can create storyboards; make QuickTime thumbnails; or edit, assemble, and log videotapes. 5MB min. memory; requires Mac II and video-capture board. $548. HATNet, 408/725-2810; fax 408/725-0309.

WorkFlow Administrator
An application for managing files and jobs over a workgroup. The software is based on 4th Dimension 3.0 from ACI US and provides automatic backup, archival and purge operations, support for up to 40 online users at once, password protection, and system-monitoring tools. 8MB min. memory. Server license fee $250; 1 to 4 users $375 per user; 5 to 9 users $325 per user; 10 to 24 users $275 per user; 25 and more users $225 per user. North Atlantic Publishing Systems, 508/250-8080; fax 508/250-8179.

Working Model
Motion simulator for building and testing physical systems. Users give objects physical properties such as mass, friction, and elasticity. When a simulation runs, the software calculates the motion of each object and displays the animated movement. Users can import CAD documents and animate them, and export their animations in popular formats such as Macromedia Three-D and WaveFront. 5MB min. memory; requires System 7 and Mac II. $995. Knowledge Revolution, 415/553-8153; fax 415/553-8012.

A Zillion Kajillion Rhymes
Who knows where Shakespeare would have gone if he'd had this package? The product's search engine can strip prefixes and suffixes to find double and triple rhymes, and the dictionary contains common, technical, literary, and slang words. $34.95. Eccentric Software, 206/628-2687; fax 206/628-2681.

CD-ROMS

1993 Guinness Multimedia Disc of Records
Guinness put the *est* in biggest, fastest, and strongest; and Grolier has put Guinness on disc. This product features over 2000 new or updated records, over 700 pictures, and dozens of QuickTime video clips with audio. Requires Mac LC or higher with 256 colors. $99. Grolier Electronic Publishing, 203/797-3500, 800/356-5590; fax 203/797-3835.

1993 Guinness Multimedia Disc of Records

CD Stock
A catalog of low-resolution (72-dpi) images suitable for comp and layout work. Product includes a built-in search system that allows users to browse randomly through the images or to narrow the focus by typing in keywords. Users must still negotiate usage rights with company and then obtain actual images. $175. Stock Market, 212/684-7878, 800/999-0800; fax 212/532-6750.

A Hard Day's Night
Roll up for the magical mystery tour. This disc contains the complete uncut movie *A Hard Day's Night,* the entire script, text about the Beatles and the rise of rock and roll, a Beatles photo gallery, and profiles of the songs and film cast. $39.95. The Voyager Company, 310/451-1383, 800/446-2001; fax 310/394-2156.

Mayo Clinic Family Health Book
Electronic version of 1378-page health-care reference. The book includes advice on nutrition, wellness, first aid, and the health-care system, as well as information on over 1000 diseases and disorders, including symptoms, prognoses, and treatments, all illustrated with pictures and videos. 4MB min. memory; requires Mac LC. $99.95. Interactive Ventures, 612/686-0779; fax 612/686-0721.

The Oregon Trail CD

The Oregon Trail CD
Students have been traveling the Oregon trail since the Apple II was king, and now they can see their fellow pioneers and hear them talk. Players assume the roles of settlers traveling by covered wagon across the rugged landscape of nineteenth-century America from Independence, Missouri, to the Willamette Valley in Oregon. 4MB min. memory. $69. MECC, 612/569-1500, 800/685-6322; fax 612/569-1551.

ACCESSORIES

ACS 100/150
You can't rip the roof off the joint with that tiny Mac internal speaker, but this satellite/subwoofer combination might help. Speakers are magnetically shielded to prevent interference, and feature Digital Signal Processing circuitry to simulate stereo from mono sources. The ACS 100 (satellite) will mix input from two audio sources. The ACS 150 (subwoofer) features two 4-inch drivers that should add some punch to a presentation. ACS 100 $180; ACS 150 $150. Altec Lansing Consumer Products, 717/296-4434, 800/258-3288; fax 717/296-2213.

ProPresenter
It's a credit card. No, it's a remote control. No, wait, it's . . . This package consists of configuration software, a base that plugs into the Mac ADB port, and a credit card–size two-button remote. Users can wander around the room, assaulting the audience at will, while the Mac responds like a trained dog to the user's stealthy clicks. $99. Presentation Electronics, 916/652-9281, 800/888-9281; fax 916/652-9286.

ProPresenter

BOOKS

Fit to Print with QuarkXPress
This design primer teaches DTP fundamentals using QuarkXPress. Chapters cover such topics as creating a visual path for the reader to follow, using pictures effectively, and working with printers and service bureaus. Written by Lauren Smith. 350 pages. M&T Books, 415/358-9500, 800/488-5233; fax 415/358-8728.

MacWrite Pro Inside & Out
These authors had plenty of beta-testing time to prepare their tome. This book covers MacWrite Pro from basic documents to desktop publishing. Recipes for creating résumés, newsletters, forms, academic papers, and catalogs are included. Written by Steve Michel and Dale Coleman. 439 pages. $24.95. Osborne/McGraw-Hill, 415/549-6600, 800/227-0900; fax 415/549-6603.

The Photoshop Wow! Book
Step-by-step guidelines for using Adobe Photoshop 2.5. Book includes disk with special-effects filters, keystroke programs, sample textures, and other enhancements. Written by Linnea Dayton and Jack Davis. 200 pages. $35. Peachpit Press, 510/548-4393, 800/283-9444; fax 510/548-5991. **m**

To have your product considered for inclusion in *New Products,* send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number to New Products Editor, *Macworld,* 501 Second St., San Francisco, CA 94107. *Macworld* reserves the right to edit all product announcements.

Questions and Tips from Macworld Readers

BY LON POOLE

THE LOAN AMORTIZATION spreadsheet in March's *Quick Tips* calculates the wrong payment dates if the initial date is after the 28th of the month. To fix the problem, first add the following formula to cell E8:

```
=DAY(D8)
```

Then change the formula for cell C15 as follows, and fill down from C15 to the bottom of your amortization table:

```
=DATE(YEAR(C14)+INT(MONTH(C14)/12),MOD(MONTH(C14),12)+1,IF($E$8<29,$E$8,IF(MONTH(C14)+1=2,IF(YEAR(C14)/4<>INT(YEAR(C14)/4),28,29),IF($E$8<31,$E$8,CHOOSE(MONTH(C14),28,31,30,31,30,31,31,30,31,30,31,31)))))
```

The amortization table works in ClarisWorks 1.0, Claris Resolve 1.1v1, and Microsoft Excel 4.0. It also works in Microsoft Works 3.0 if you break down the long formula in C15 into four parts, using cells I15, J15, K15, and L15 for each part as follows (fill down from C15, J15, K15, and L15 to the end of your table):

```
C15=DATE(I15,J15,K15)
I15=YEAR(C14)+INT(MONTH(C14)/12)
J15=MOD(MONTH(C14),12)+1
K15=IF($E$8<29,$E$8,IF(MONTH(C14)+1=2,IF(YEAR(C14)/4<>INT(YEAR(C14)/4),28,29),IF($E$8<31,$E$8,L15)))
L15=CHOOSE(MONTH(C14),28,31,30,31,30,31,31,30,31,30,31,31)
```

If you have trouble with the spreadsheet, ask someone else to proofread the formulas in your copy of it. With long formulas like these, it's understandably easy to make typographical errors.

Back from the Trash

Q. I just got Norton Utilities for Macintosh (NUM). When I tried the UnErase feature, which claims to bring back deleted files, it presented me with a pretty big list of all the files I had trashed. Are all these trashed files still on my hard drive taking up space?

James E. Rodriguez
West Covina, California

A. The disk space occupied by deleted files is available for other files. The Empty Trash command removes a file's entry from the relevant disk's file directory and changes the disk's sector allocation table to indicate that the disk sectors the file occupied are available for use by another file. To save time, the command does not erase file contents in those now-available sectors. Until the system allocates some of a deleted file's sectors to a new or expanded file, NUM's UnErase and similar utility software can resurrect the deleted file from its contents (creating a new directory entry for it and reallocating the sectors it occupies). Any blackguard with disk utility software can retrieve files you deleted—or view any fragment of their contents—unless you erase the contents of the files with utility software such as NUM's WipeInfo.

QuickTime Primer

Q. I received QuickTime with my system software, but I do not know what I need to use it (for viewing movies).

JeffK97513
via America Online

A. Apple includes the QuickTime system extension and a new QuickTime-capable Scrapbook with its System 7.1 products (including System 7 Personal Upgrade Kit, which you can buy from a software retailer or directly from Apple by calling 800/769-2775). QuickTime works on any Mac originally equipped with a 68020, 68030, or 68040 CPU. The Mac needs a hard drive and at least 4MB of RAM. Sooner or later, you will also need a CD-ROM drive with an average seek time less than 400 milliseconds. With QuickTime installed in your Extensions folder, you can copy, paste, and play movies in the new Scrapbook and in the documents of many popular applications (see "Movie Control"). You can also compress individual graphics with QuickTime; when you open a compressed graphic, QuickTime automatically decompresses it. For the latest information on the QuickTime compatibility of a particular application, ask its publisher.

QuickTime basics, color theory, double aliases, delayed printing, and more

You can get prerecorded QuickTime movies on CD-ROM from user groups such as BMUG (510/549-2684, 800/776-2684) and BCS Mac (617/625-7080); Apple's QuickTime Starter Kit (from software retailers); and commercial companies (for a sampling see "Top 10 CD ROMs," *Macworld*, March 1993). If you don't have a CD-ROM drive but do have a modem, you can download QuickTime movies from online information services such as CompuServe and America Online, but acquiring movies by modem can be expensive because of their hefty size (even brief—less than 15-second—QuickTime videos consume between 300K and 1MB).

To record your own QuickTime movies, you need at least 5MB of RAM and an unused expansion slot, gobs of hard disk space, a video source, and a video-capture board. Video sources include broadcast TV, VCRs, camcorders, and videodisc players. The video source feeds into the capture board, which is plugged into the Mac's expansion slot and converts the incoming video to a QuickTime movie. Radius, RasterOps, SuperMac Technology, and Workstation Technologies make adapter boards that digitize full-motion video directly to disk (see "The Full-Motion Macintosh," *Macworld*, January 1993).

The Mac can also create the video source material without a video-capture board. The Movie Converter utility software, which comes with Apple's QuickTime Starter Kit, can create QuickTime movies from a series of PICT graphics files, contiguous PICT images in the Scrapbook, a PICS animation file, or an AIFF sound file. (PICT, PICS, and AIFF are standard types of Macintosh files.) Other applications, such as Macromedia's Action 1.0.1,

continues

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Movie Control You play, stop, browse, or step through a QuickTime movie and adjust its sound level with the standard QuickTime playback controller, or play bar, located beneath the movie (top). You play a movie that has a QuickTime badge in the lower-left corner instead of a play bar by double-clicking the movie (bottom). Clicking a playing movie stops it. These images are from G-Force on the QuickClips CD, which comes with Apple's QuickTime Starter Kit. The clip G-Force is licensed for use only in the QuickTime environment. For information regarding other uses, call 800/876-5115.

Macromedia Director 3.1.1, and Broderbund's Kid Pix Companion, can save slide-show presentations and animations as QuickTime movies.

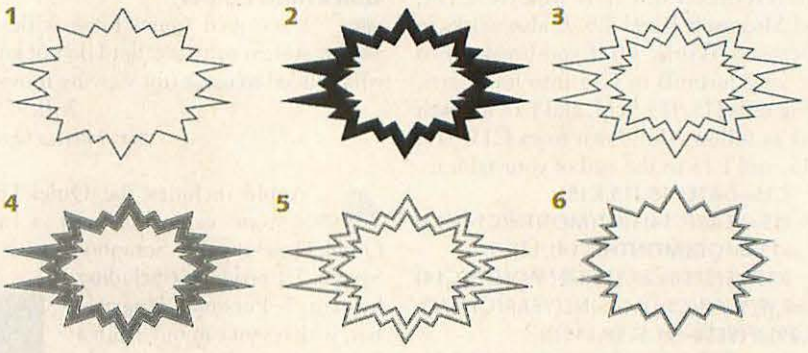
You can edit QuickTime movies with video-editing and -composing programs such as Adobe Premiere and DiVA's VideoShop. Before including other people's video and QuickTime movies in your own productions, be sure to get permission from the copyright holders.

Multiple-Line Borders

Creating perfect multiple-line borders in Aldus FreeHand is easy if you use the method suggested by Robert Guetré of Winnipeg, Manitoba, Canada. Repeatedly clone a selected path and assign decreasing line weights and different colors to the clones. This technique works for simple, uniformly spaced borders made of lines of identical weight and color, such as a black double-line border consisting of two 1-point lines separated by a 2-point white space. To create this border, start with a 4-point black border, clone it, and change the clone's line weight to 2-point and its color to white. You could add a third line to this border by cloning the white line, and making this clone's weight 0.5-point and its color black.

The same technique with two extra steps can be used to create borders having any number of elements of different weights and colors, such as starbursts. You start by drawing the outermost line of the border, ungrouping if necessary. Then you make clones and set their different weights and colors, always starting with the heaviest. Finally you cut all the clones as a group and paste them inside the original (outermost) border, which becomes a clipping path and masks out the parts of the cloned lines that fall outside the clipping path.

1. Draw the outermost border line as a 1-point closed path.
2. Clone the 1-point path, and set the clone's line weight to 12-point and its miter limit low enough to avoid clipped corners (18 degrees in this example).
3. Clone the 12-point path; set this clone's line weight to 10-point and its color to white.
4. Clone again, reduce this third clone's line weight by 2 points (to 8-point), and make it gray.
5. Clone one last time, reduce the clone's line weight (so it's less than 8-point) and change its color to white.
6. Select all clones (but not the original path), then cut and paste them inside the original path. Selecting the clones can be simplified by temporarily sending the original path to another layer and turning off multilayer selection.



Lost in Color Space

Q. My sense of intellectual curiosity requires me to identify the mythical 256 colors that are inherent in my LC with a 12-inch monitor. Considering that each of the six categories—hue, saturation, brightness, red, green, and blue—can have a value from 0 to 65536, there are many mathematical options. I believe that 65,536 raised to the sixth power is 7.92282×10^{28}.

Dennis D. McMahon
San Francisco, California

A. The Macintosh system software (System 7, and System 6.0.5 or later with 32-bit QuickDraw in ROM or in the System Folder) defines colors in terms of their red, green, and blue (RGB) components. For example, pink is a combination of intense red with less intense green and blue. The intensity of each component is specified by a 16-bit number between 0 and 65535, higher values for higher intensity. Theoretically, there are more RGB colors than the human eye can discern—$2.814749767 \times 10^{14}$ (65536 red × 65536 green × 65536 blue). The system software works with several subsets of the complete set of RGB colors, and you select the subset size in the Monitors control panel—black and white, 4 colors or grays, 16 colors or grays, 256 colors or grays, thousands of colors (16,384), or millions of colors (about 16.8 million). Using fewer colors requires less RAM and disk space to store images.

Colors can also be defined in terms of their hue, saturation, and brightness instead of their red, green, and blue components. Color hues are identified by number (for instance, red is 0, green is 21845, and blue is 43690); saturation measures the color's intensity (the amount of white the color contains); and brightness measures the amount of black in the color. With this method, you would define pink as having a red hue, less than full saturation, and full brightness.

continues

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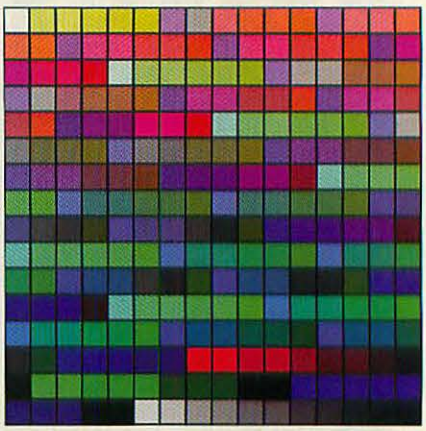


System Colors This standard palette of 256 colors is used by default to display all images when the Monitors control panel is set for 256 colors.

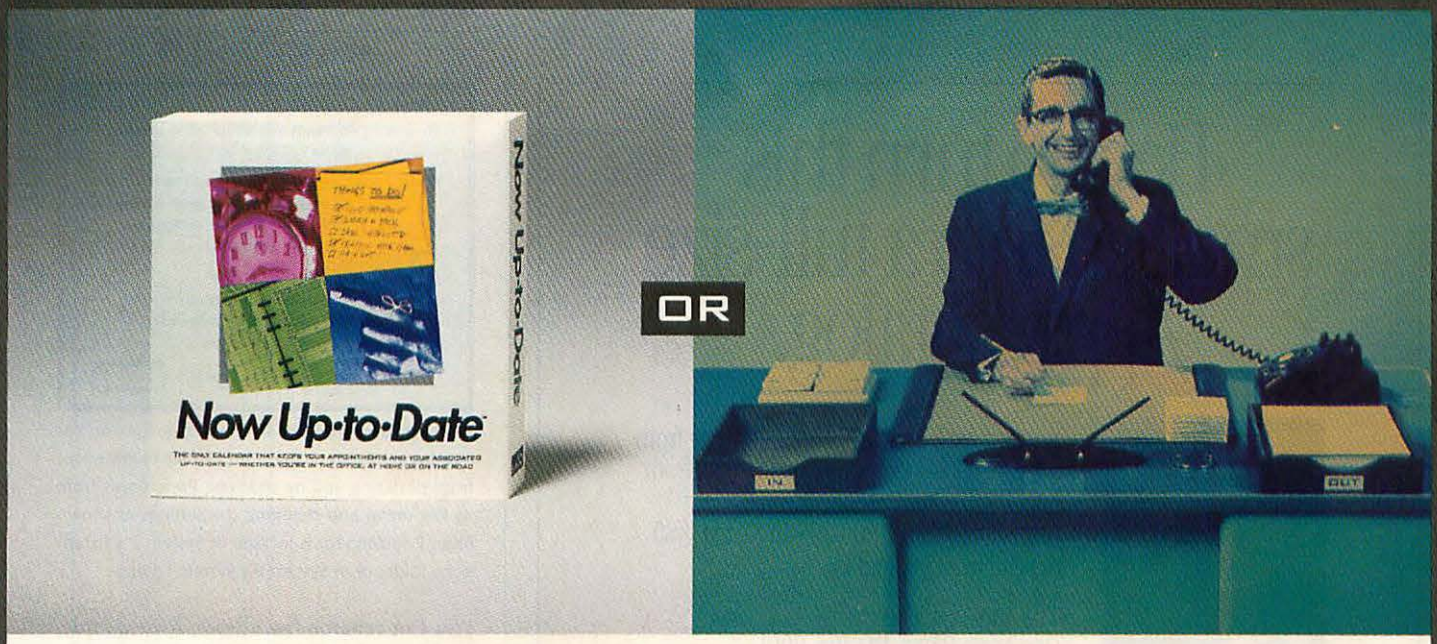
With the Monitors control panel set to 256 colors, the Mac system software works with a palette of 256 colors chosen from among the 16.8 million (see "System Colors"). Applications can modify the palette, for example, using a palette of blues to display works from Picasso's blue period and a more varied palette for his later works. With some applications you can create your own alternative palettes.

An Alias's Alias

TIP Our network has several AppleShare file servers, each connected to one or more shared hard drives. Occasionally I want to move a shared drive from a busy server to an idle server, or I need to relocate the drives connected to a server needing repair. If I move a drive, however, users have to tediously search all servers (using the Chooser) for the moved drive unless I inform them of its new location.

I solved this problem by creating double aliases of the shared drives. First, working from a shared hard drive that is always available to everyone, I created an alias of every shared hard drive on the network. Then I created aliases of those hard drive aliases and copied the second set of aliases to each user's Mac. With the double aliases in place, a shared hard drive named Crown Jewels, for example, could be accessed by double-clicking *Crown Jewels alias alias* on any user's Mac; that alias would point to *Crown Jewels alias* on the always-available shared drive, which in turn would point to Crown Jewels itself. Now, if I move Crown Jewels to a different file server, I merely make a new alias to replace the old *Crown Jewels alias* on the always-available shared drive. I do not have to update users' copies of *Crown Jewels alias alias*, and users do not need to know that Crown Jewels moved. (Rather than use the Mac-generated alias names,

continues



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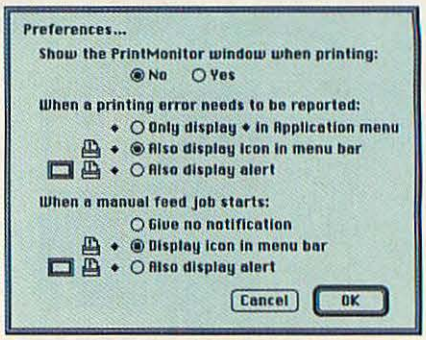

Do Not Disturb While queuing documents for later background printing, you can keep PrintMonitor from pestering you by choosing Preferences from its File menu and changing the settings as shown here. PrintMonitor is located in System 7's Extensions folder or in System 6's System Folder.

you can rename the aliases; for example, both the alias and the alias's alias could be named *Crown Jewels* like the hard drive.)

Jed C. Morris
Groton, Connecticut

Print Later

TIP When I travel with my PowerBook and I finish a document, I like to get it out of my head and not have to think about printing it later. So I turn on the Background Printing option in the Chooser and set preferences in the PrintMonitor program to not bother me if it can't find the printer (see "Do Not Disturb"). Now I can print any number of documents any time, and the printer driver saves the page images for each document as a spool file in the PrintMonitor Documents folder (inside the System Folder). If PrintMonitor can't find the printer, it flashes its icon in the menu bar. I know this means it wants to display an alert about the missing printer, so I ignore the flashing icon until I have a printer connected and ready. Then I open PrintMonitor, and when it asks what I want to do about the printing problem I click the Try Again button to have all the waiting spool files printed. While I have items that are waiting to be printed I put my PowerBook in sleep mode but never shut it down; otherwise I would lose the spool files waiting to be printed and would have to print them again.

Kurt Prasse
San Francisco, California

You can shut down your Mac without deleting spool files—but you must respond correctly to two alert dialog boxes that appear at the end of the shutdown process. The first alert tells you something is being printed, and asks if you want to finish printing or print later; you must click the Print Later button. Then another alert tells you the printer can't be found; click the Cancel Printing button to conclude

continues

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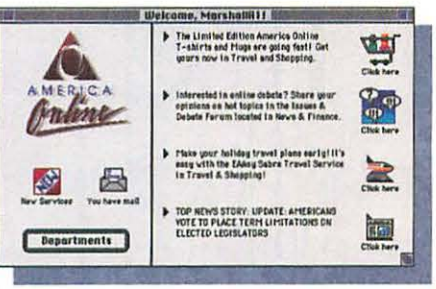

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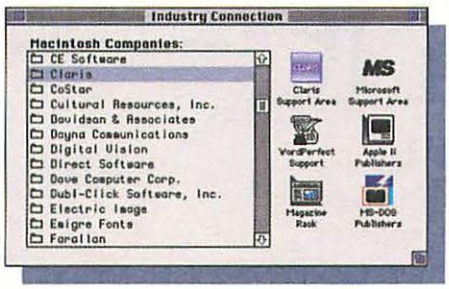

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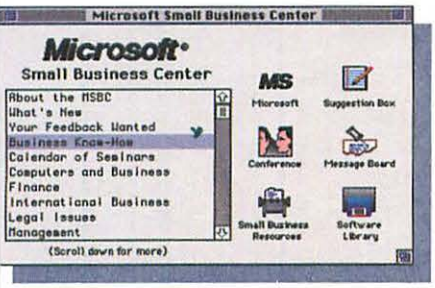

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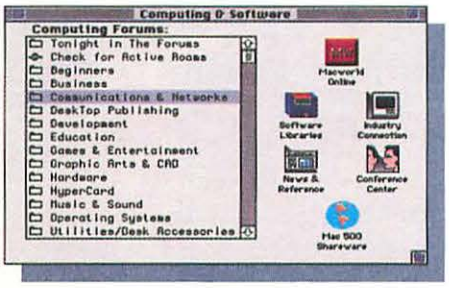

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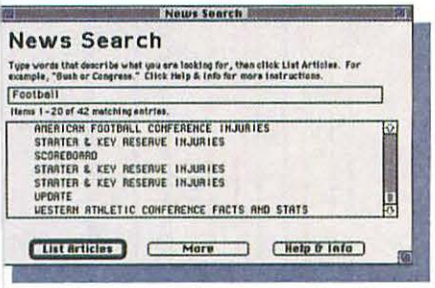

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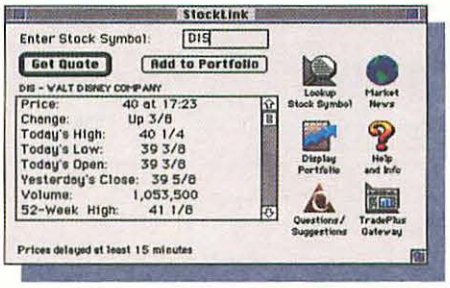

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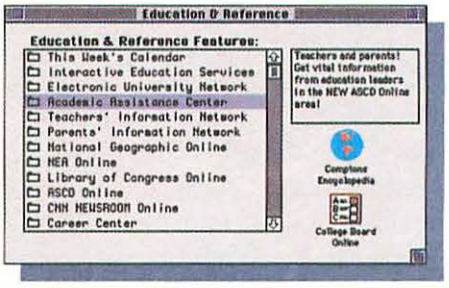

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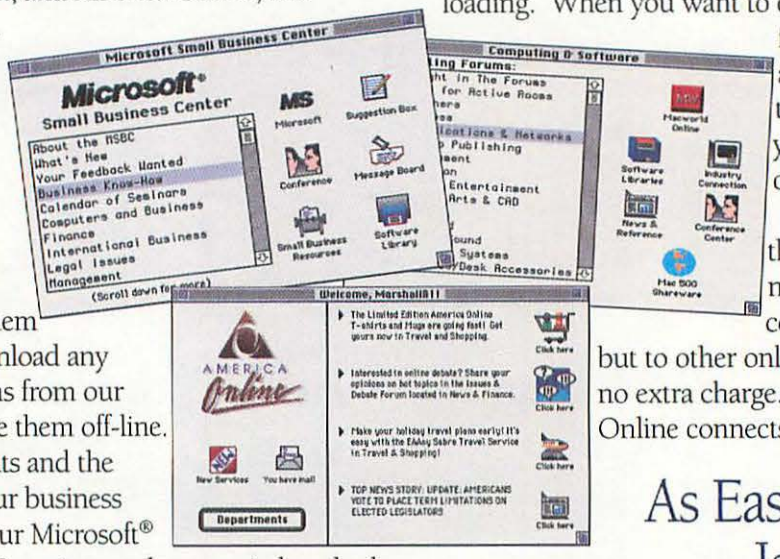

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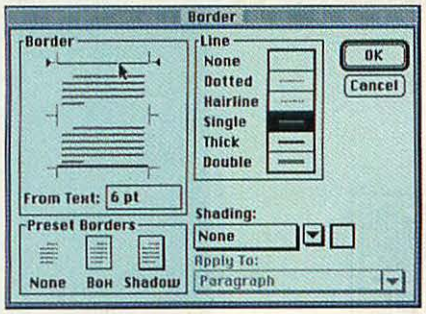

Border Changes Changes you make to Word's From Text and Line options in the Border command's dialog box only affect sides of the border that are selected in the border model—that is, sides marked with double-arrows at their ends. To select a side, click it; shift-click to select multiple sides.

the shutdown process without losing any spool files. (If you click Try Again instead, you abort the shutdown process and PrintMonitor tries again to find the missing printer.) This is somewhat confusing because clicking Cancel Printing ordinarily (except after clicking Print Later) does delete the spool file being printed.

Background printing is available with System 7 and with System 6 with MultiFinder active for the StyleWriter, most LaserWriter models, and some other types of printers.—L.P.

Near the Border

TIP In Microsoft Word 5.0 and 5.1, don't try to change the amount of space between an existing border and the text it surrounds. Although you can enter a new value for the Border command's From Text option, Word always resets that option to the value it had when the border was created. The trick is to remove the border entirely, click OK to dismiss the Border command's dialog box, choose the Border command again, and enter a value for the From Text option before setting other border attributes.

Steve Berry
Seattle, Washington

Your method works—and applies to the Border command's Line option as well—but there's a simpler method for changing a border's line text offset and line style (see "Border Changes").—L.P. m

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LON POOLE answers readers' questions and selects reader-submitted tips for this monthly column. His latest book is *Macworld Guide to System 7.1* (IDG Books Worldwide, 1992).

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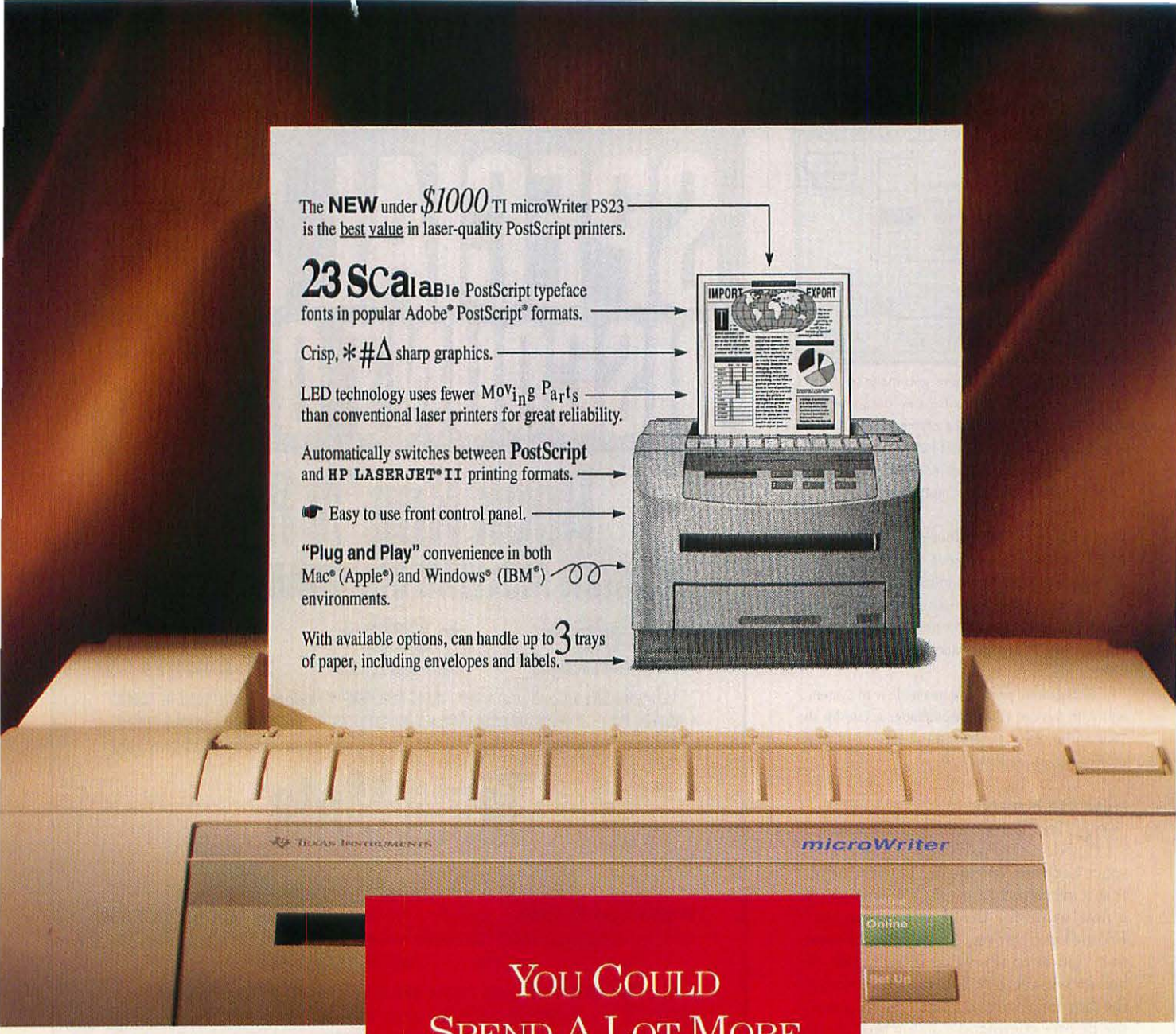

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Macros and Scripting

BY JIM HEID

"Watch me and learn," the master commanded, "so you can do it yourself next time."

No, you didn't pick up a martial arts magazine by mistake. The above sentence presents the gist of a hot trend in the Macintosh world, one that will probably change the way you use your Mac—if it hasn't already. I'm referring to the ability to automate repetitive jobs by recording sequences of commands, keystrokes, and mouse movements for later playback. Such a sequence is called a *macro*, and it's a remote-control freak's fantasy. Imagine a Mac on autopilot—the pointer plowing across the screen, menu commands flashing, dialog boxes appearing and disappearing without any dialog. That's a macro.

Creating a simple macro involves choosing a recording command, performing some activities, and then choosing a stop-recording command. When you play back the macro, the Mac goes into autopilot while you go do something else.

Programs that let you record and play macros have been available for years—the two veterans are Affinity Microsystems' (303/442-4840) Tempo II Plus and CE Software's (800/523-7638) QuicKeys. But these utilities are being joined by a new generation of macro tools that provide finer controls by allowing you to create *scripts*—sequences of events that you can play back as well as edit and embellish. In its most advanced form, creating scripts is a form of programming. A script can contain IF-THEN options that enable it to play back different steps depending on certain conditions: "If I've created any files that haven't been backed up today, run my backup program and then shut down. Otherwise, just shut down."

Macro and scripting features are built into a growing number of programs, including Microsoft Excel and Works, ClarisWorks, Lotus 1-2-3, Aldus PageMaker, WordPerfect, and Claris FileMaker Pro. "Macros Spoken Here" compares these programs' automation features.

But the latest word in Mac automation is Apple's own AppleScript, a new enhancement to System 7 that lets you create scripts that control the Mac's Finder as well as application programs that support AppleScript. This month, I spotlight AppleScript's benefits and show how it relates to QuicKeys and Tempo II Plus and to the built-in macro and scripting features many programs provide.

Why Macros?

BEFORE LOOKING AT SPECIFIC MACRO and scripting tools, let's look at the ways you can put them to work.

- *Create custom keyboard shortcuts.* A macro doesn't have to perform step after step. One of the most common uses for a macro product like QuicKeys is to create keyboard shortcuts that start programs or that choose menu commands, tools on palettes, or buttons in dialog boxes. It's a great way to put an extended keyboard's 15 function keys to work.
- *Streamline system adjustments.* If you frequently switch between monitor settings, network printers or file servers, or other control panel or Chooser-related options, you can set up macros that automate the process. QuicKeys is especially handy for this—it includes an entire category of macro options designed to cut down on trips to the Control Panels folder.
- *Simulate the style sheets or glossaries found in word processors.* Powerhouse word processors such as Microsoft Word have style-sheet features that automate repetitive formatting, and glossary features that let you store and recall often-used text (for more on style sheets, see *Getting Started*, March 1993). Most other programs don't have these features, but you can simulate them with macros that choose the desired font and formatting commands or insert often-used text.
- *Automate search-and-replace or reformatting operations.* Say you're a desktop publisher and one of your first steps in every job is removing the extra space that the folks in the typing pool always put after each sentence. Create a macro that chooses your word processor's Replace command, types two spaces in the Find What box and one space in the Replace With box, and then click on Replace All. Similarly, if you frequently retrieve data from the company mainframe and then reformat it for import into a database or spreadsheet, you can set up a macro that does the formatting and importing for you.
- *Batch-process files.* Say you work with Adobe Photoshop and you always apply a certain filter to freshly scanned images. You can set up a macro that automatically opens a file in a given folder, applies the filter, saves the file, and then proceeds to the next file.
- *Create a customized application.* With the macro and scripting languages provided by programs such as Excel and Apple's HyperCard, you can create custom applications with pull-down menus and dialog boxes to prompt for information and allow users to choose various options—macro making at its most ambitious.

From keyboard shortcuts to autopilot scripts, how to take control of your Mac

QuicKeys and Tempo II Plus

WITH EITHER OF THESE UTILITIES YOU can accomplish all aspects of Mac automation except creating customized applications. Although they share similar features, each program takes its own approach to macro making.

Using the watch-me style of macro making, Tempo II Plus adds a ⌘ menu to the Mac's menu bar; to begin recording a macro, choose Start Recording from this menu. Then perform the steps you want to record—choose a menu command, type some text, click on a button. When you're done, choose Stop Recording, and Tempo asks you to save the macro and give it a keyboard shortcut (see "In Tempo").

QuicKeys' record mode works similarly, but it takes a backseat to the QuicKeys control panel, which is where you'll probably create most of your macros. The QuicKeys control panel's Define menu is packed with predefined shortcuts: insert the time and date, close or scroll through windows, adjust system settings (see "QuicKeys Control").

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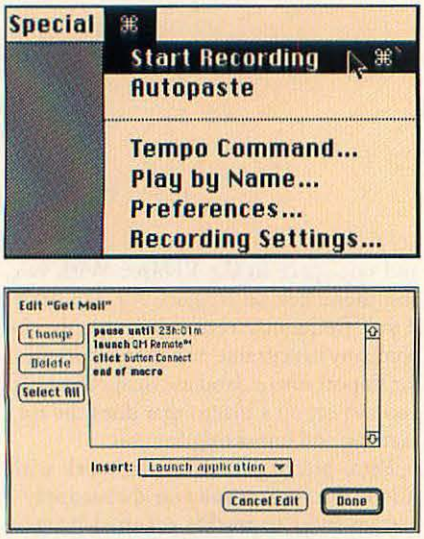


In Tempo Affinity's Tempo II Plus adds a ⌘ menu to the menu bar, which lets you record, play, and edit macros (top). This macro waits until 11:01 p.m.—when phone rates drop—and then runs an electronic-mail program (in this case, QuickMail Remote) that retrieves any waiting correspondence (bottom).

Other commands in the Define menu let you create shortcuts for clicking on buttons, choosing menu commands, typing text, clicking or double-clicking at a specific location within a window, and much.

Both QuicKeys and Tempo II Plus let you create *universal* and *application-specific* macros. Universal macros, which work in any program, can be used to create keyboard shortcuts for scrolling, resizing windows, starting programs, or typing your name and address—tasks you're likely to perform in more than one program. To create a shortcut that you need in a particular program, use an application-specific macro, which is available only when that program is active.

Most people create keyboard shortcuts for their macros, but both Tempo II Plus and QuicKeys also provide menus that let you start macros using the mouse. Both let you create icons that run macros when you double-click on them. They even offer timing options for specifying that a macro run at certain intervals.

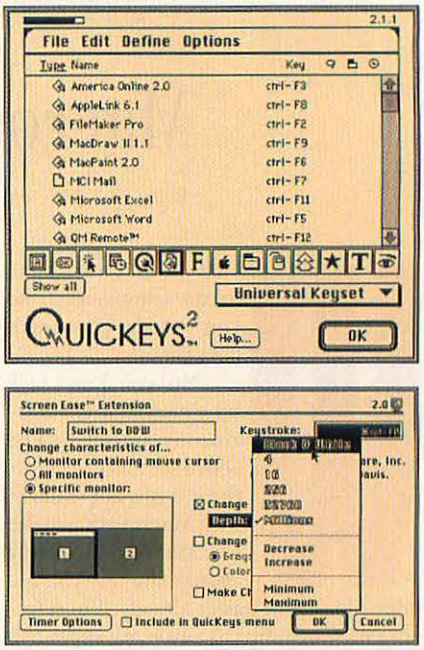
Although macros are relatively simple to create, they may not always be problem-free. A number of pitfalls can trip up a novice macro writer, but QuicKeys and Tempo II Plus provide detours around them. (For a guide to solving the most common macro maladies, see "Macro Troubleshooting Tips.") You get more-reliable macros when you go beyond simply recording a series of events to take advantage of the "smart" features that QuicKeys and Tempo II Plus provide.

So which macro utility should you use? I'm partial to QuicKeys. For the simple macros I create—menu command and scrolling shortcuts, file-opening macros—QuicKeys lives up to its name. But Tempo II Plus does have the edge when it comes to creating complex macro sequences whose playback depends on certain conditions being met. QuicKeys' IF-THEN capabilities are more limited.

The AppleScript Difference

QUICKEYS AND TEMPO II MUST PROVIDE their smart features because application programs are dumb—they aren't designed to be operated by remote control. But what if an application *were* designed with automation in mind? What if it provided a vocabulary of explicit commands that a macro utility could use? The vocabulary would incorporate terms specific to the application—cells, ranges, and charts for spreadsheets, for instance; fields and records for a database; or paragraphs and words for a word processor. When you performed specific tasks, the application would broadcast messages describing what you did. A macro utility could record these messages, incorporating explicit instructions instead of simply simulating mouse-clicks and keystrokes.

Apple's recently released AppleScript promises to bring this kind of intelligence to the macro world. AppleScript builds on a System 7 mechanism called *Apple events*,



QuicKeys Control CE Software's QuicKeys control panel (top) provides menus for creating new macros, and lists ones you've already created. The macros shown here allow me to start programs by pressing the control key along with a function key. QuicKeys' Screen Ease Extension (bottom) is just one of many extensions for making system adjustments. Screen Ease lets you switch between frequently used monitor settings without opening the Monitors control panel. Here, Screen Ease is being set up to switch a monitor into black-and-white mode when ⌘-option-F15 is pressed.

which allows programs to exchange commands and data. Last May's column on data exchange looked at one aspect of Apple events—the publish-and-subscribe commands that let you create links between documents.

But just as application programs must be designed to support publish-and-subscribe, so must they be written to work with AppleScript. Apple, skilled jargon generator that it is, calls a program that supports AppleScript *scriptable*. A program can be scriptable on a few levels. A pro-

continues

MACROS SPOKEN HERE

Macro Features	Aldus PageMaker	Claris FileMaker Pro	ClarisWorks	Lotus 1-2-3	Microsoft Excel	Microsoft Works	WordPerfect
Macros or scripts are editable	●	●	○	●	●	○	○
Record mode creates macros automatically	○	○	●	●	●	●	●
Allows conditional statements/custom dialog boxes	●/○	●/limited	○/○	●/●	●/●	○/○	○/○
Macros or scripts can appear in menu/have keyboard shortcut	●/○	●/●	○/●	●/○	●/●	○/●	○/●
Best uses	automation	automation, creating simple custom applications	automation	automation, creating custom applications	automation, creating custom applications	automation	automation

● = yes; ○ = no.

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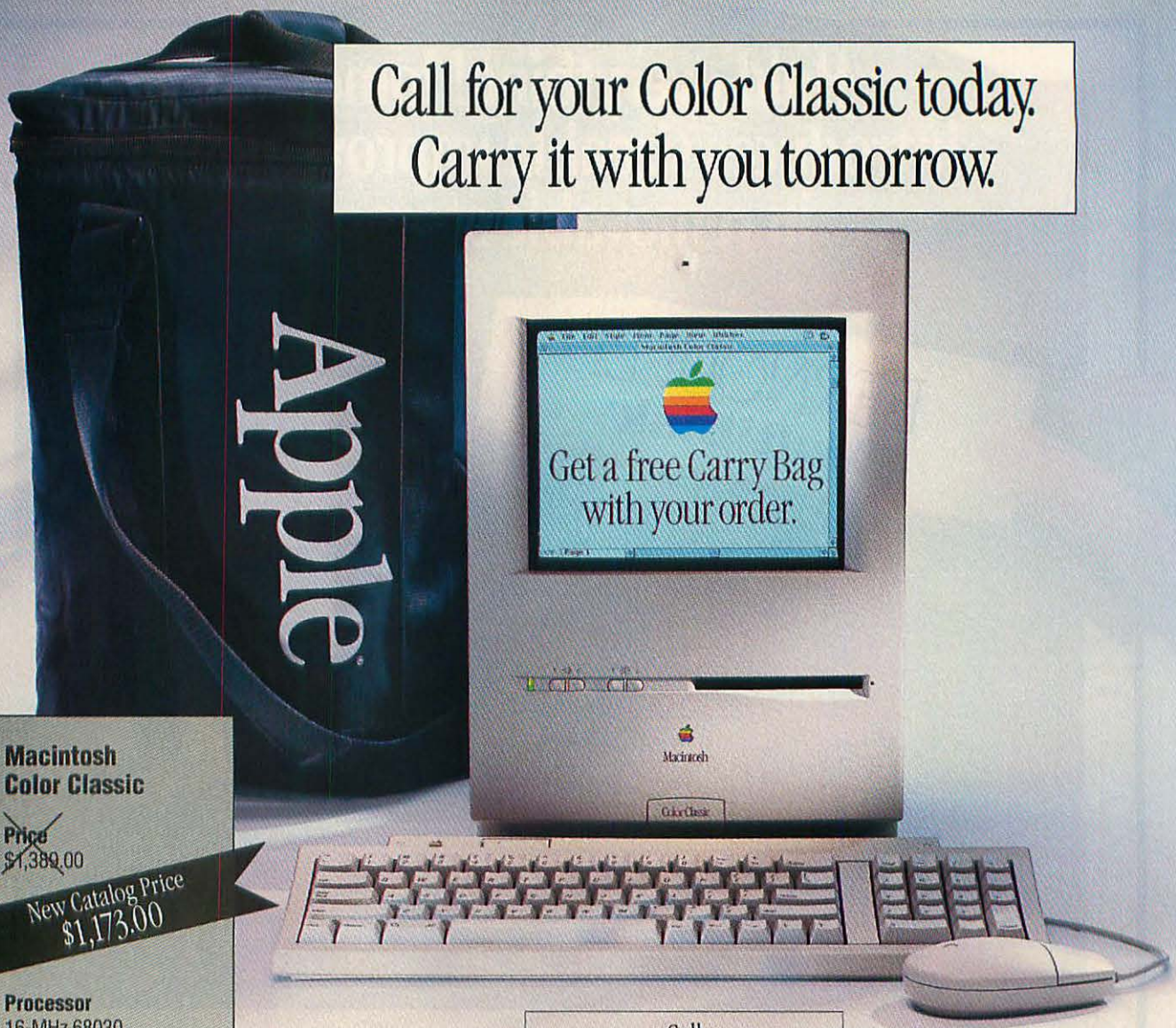

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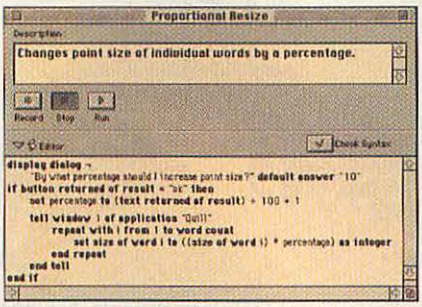
gram that is *recordable* can work with a script editor utility to automatically create scripts as you work—much like Tempo II Plus and QuicKeys create macros by recording mouse-clicks and keystrokes. You can still create scripts for a program that isn't recordable, but only by typing the script manually.

A program that's *attachable* lets you assign, or attach, scripts to menu commands or to buttons or other on-screen elements. When you click on or otherwise activate an element to which a script is attached, the script runs. For example, you could customize the way a certain program's Save command works by adding a logging feature that tracks how much time you spent working with the file.

AppleScript also lets you turn a script into a tiny program that you can run directly from the Finder. Such a miniprogram is called an *applet*. You can also create a special type of applet, called a *droplet*, that acts like a drop box—you can drag icons for files, folders, or disks to the icon of a droplet, and the droplet runs and then performs some kind of operation on those items. You might create a droplet that prints the files dragged to it, or creates aliases of them, or copies their names into a database, or duplicates them and then opens the duplicates.

At this writing, only one program fully supports AppleScript. Aladdin Systems' StuffIt Deluxe 3.0.5 is both recordable and attachable. Numerous other programs, including Microsoft Excel 4.0, Claris FileMaker Pro 2.0, and Deneba's Canvas 3.0, support AppleScript to some extent, but it will probably be a few months before full scriptability becomes pervasive in the Macintosh world. Even the current version of the Mac's Finder doesn't fully support AppleScript. Apple is working on a recordable Finder, but hasn't announced an availability date.

At present, AppleScript is available only through the Apple Programmer's and Developer's Association (APDA), Apple's source for developer tools (800/282-2732). The $199 AppleScript Developer's Toolkit includes documentation and a utility, called Script Editor, that lets you record, edit, and play back scripts (see "Apple Script"). The AppleScript Developer's Toolkit includes a bare-bones word processor, called Quill, that is recordable. You can use Quill to experiment with the power of AppleScript until your favorite word processor is updated. APDA also sells the $20 AppleScript Runtime Kit, which doesn't include Quill and also lacks the extensive documentation that accompanies the developer's tool kit.



Apple Script The Script Editor that accompanies Apple's AppleScript Developer's Toolkit and AppleScript Runtime Kit lets you record, play, and save scripts. The script shown here works with the Quill program that's included with the developer's tool kit. The script lets you change the type size of the text in a Quill document by specifying a percentage value.

Recording a Script Editor script is similar to recording a Tempo II Plus or QuicKeys macro. Click on Script Editor's Record button, then switch to a recordable application program and perform the tasks you want to record. If you position your windows so that you can see both the program and Script Editor, you'll see script commands appear in Script Editor's window as you work. When you've finished, you can save the script conventionally or as an applet or a droplet.

What with only a few programs supporting it, AppleScript isn't likely to have an immediate impact on the way you use your Mac. Apple has poured the foundation for heavy-duty scripting, but it's up to the architects and carpenters of the software world to build on it. Expect to see AppleScript support included in the next major revision of your favorite programs. Also expect to see more-sophisticated script editors appearing from third-party utility makers. When AppleScript hits its stride, there will be no end to the slick ways you can put your Mac to work.

Macro Troubleshooting Tips

Here's how to avoid the most common macro pitfalls in Tempo II Plus and QuicKeys.

- **Problem:** A file-opening macro you create by invoking your utility's Record command and double-clicking on a file's icon won't work if you later move the icon; when Tempo II Plus or QuicKeys plays the macro, the Mac double-clicks on the wrong icon or no icon at all.
  Solution: Specify which file or program you want a macro to open. In Tempo II Plus, choose Options from the ⌘ menu and click on either the Launch Application or Launch File button, and then choose the program or file to be opened. In the QuicKeys control panel, choose File from the Define menu and then select the desired program or file.
- **Problem:** Macros that choose menu commands can fail if a program changes its menu wording as it operates. (For instance, most word processors have a Show Ruler command that changes to read Hide Ruler when the ruler is visible.)
  Solution: Tell the macro program to choose the command based on its position within a given menu rather than on its wording.
- **Problem:** A macro that checks a box within a dialog box can fail if the box is already checked when the macro runs.
  Solution: Enable Tempo II Plus's Smart Check Boxes option (in the Preferences dialog box) before recording the macro. In QuicKeys' Button dialog box, select the Only Click If Button Is Off option.
- **Problem:** A macro that selects a tool in a palette can fail if you move the palette elsewhere on the screen.
  Solution: Be sure Tempo II Plus's Enable Smart Features button is selected when recording the macro. In QuicKeys, use the Click Location dialog box to tell QuicKeys to click relative to the document window (in this case the palette).
- **Problem:** The macro utility may appear to skip some steps when playing back a multistep macro.
  Solution: Add pauses between the steps. Use the Pause command in QuicKeys' Define menu or the Pause for Interval command in Tempo II Plus.

End of Script

THIS IS MY 80TH *GETTING STARTED* COLumn. It's also my last. Next month, I will be starting a new and improved column for *Macworld*. But I can't wrap up my stint as Mr. Getting Started without a double-click and a tip of the hat to my editor and colleague Cathy Abes, who took over *Getting Started* shortly after its inception in 1986 and has since expertly polished dozens of columns, too many of which in- volved missed deadlines and last-minute changes and corrections. It's been fun, and I hope my new editor is as patient and skilled—and as fond of my standard poodle.

I hope you've enjoyed my attempts to demystify the Macintosh and I hope you'll join me in my new assignment. **m**

Contributing editor JIM HEID looks at a different aspect of Mac fundamentals each month. His latest book is the second edition of *Inside the Apple Macintosh* (Brady, 1992), which he coauthored with Peter Norton.

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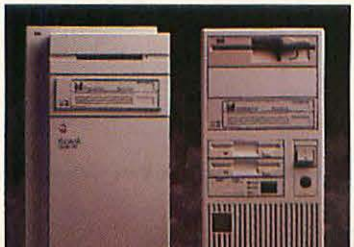

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BY CARY LU

PowerBook Notes

The Network Connection

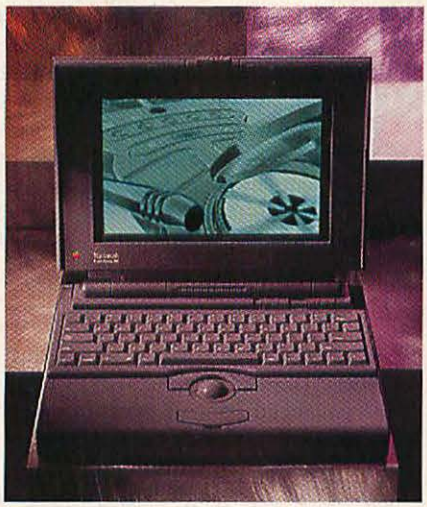
TODAY, TO PARAPHRASE JOHN DONNE, no computer is an island, entire of itself. Nearly every computer is connected to a network at least part of the time—even the PowerBook, which works pretty well as an island. A network—with its mass of wires, passwords, and administrative decisions—is in some ways the antithesis of the PowerBook.

Yet nearly every PowerBook user has to cope with a network at some point—to use a laser printer, to exchange files, to send and retrieve electronic mail. Of course, you could avoid networks entirely by exchanging information via floppy disk; for the occasional file transfer, a floppy does the job with less fuss than a network. But in the long run, connecting to a network makes information-sharing much easier.

Connecting Up

ANY POWERBOOK CAN CONNECT TO A LocalTalk network just like any other Mac; you simply plug a connector box into the printer port. Depending on the wiring for a particular network, you need either Apple's LocalTalk connector kit or equivalent for a three-wire cable, or a Farallon PhoneNet connector or equivalent for a telephone-line jack. You don't need to carry both; you can just pack a PhoneNet connector and an adapter from Farallon that connects an RJ-11 plug to a three-pin mini-DIN plug to link up to Apple's connectors.

Attaching to and detaching from a network creates a problem for a PowerBook running on batteries. To save battery power, turn off AppleTalk when you don't need it. But if you start up the PowerBook with AppleTalk off, you must go into the Chooser, turn AppleTalk on, and then restart to connect to a network.



PHOTOGRAPH BY PAUL FRANZ-MOORE/SCREEN IMAGE BY JIM LUDTKE

If you start up with AppleTalk on, then you can toggle it on and off. Loading AppleTalk takes about 60K of RAM, however. Several utilities can toggle AppleTalk. Connectix CPU version 2 lets you set a PowerBook to always start up with AppleTalk; you can then turn it off with a menu command or by selecting a battery-power configuration.

Ethernet and Token Ring

THERE ARE TWO WAYS TO CONNECT TO Ethernet and Token Ring networks. The indirect method is to connect a PowerBook through a LocalTalk gateway on a host Macintosh that has a direct connection to Ethernet or Token Ring. PowerPath software ($149, Farallon, 510/814-5000) on the host Mac acts as a gateway. PowerPath runs in the background on the host Mac and supports just one Mac connected via LocalTalk. Farallon's LocalPath ($199) supports up to eight Macs connected to a host Mac that's connected to an Ethernet or Token Ring network.

PowerPath's indirect scheme works fine for printing, file transfer, and electronic mail; but LocalTalk is too slow for intensive network use—such as launching programs across the network or working interactively on large files.

You can circumvent LocalTalk's speed limits by connecting directly to Ethernet with a SCSI Ethernet adapter, which plugs into the PowerBook's SCSI port. If you travel, then the best choice is the smallest—the Mini EN/SC adapter from Asanté Technologies (408/435-8388, 800/662-9686). About the size of two cassette tape boxes, it comes with a SCSI Y connector that attaches directly to the PowerBook's SCSI port. It weighs about 1.3 pounds with cable and power supply. The Asanté adapter comes in two forms. The $459 Mini EN/SC accepts two standard Ethernet cable types, 10BaseT—telephone-style unshielded twisted-pair (UTP) wires—and thin coaxial. The Mini EN/SC automatically selects the cable in use. The $399 Mini EN/SC-10T adapter accepts only UTP.

Other SCSI Ethernet adapters are larger, although not terribly burdensome for travel. Focus Enhancements offers one of the least expensive, the EtherLAN SC ($199.99 for UTP; add $20 for thin coax). You will also need Apple's HDI-30 SCSI System Cable adapter ($39) or equivalent to connect from a PowerBook.

Thus far, no one makes a Token Ring adapter that plugs into the SCSI port of a PowerBook; all the current adapters are designed for installation inside a desktop Mac. A NuBus board will work in Apple's large Duo Dock, but otherwise a PowerBook owner who needs to connect to Token Ring has to connect indirectly.

But watch out—whenever you need to connect to or disconnect from a network through a cable, first make sure that

continues

you're not going to bring down the network in the process. Network wiring arranged in a star configuration, such as 10BaseT Ethernet cabling, generally permits connection and removal of a node without fuss, since the cable that you attach to your PowerBook affects only your node. But when you connect to or disconnect from Ethernet coax wiring or Apple's LocalTalk wiring, the cable carries all the network traffic, so always check with the network manager before you pull any plug. If you are a guest on a network, the quickest way to get everyone's attention is to crash the network. You won't be a guest again.

AppleTalk Remote Access

INSTEAD OF PLUGGING YOUR PowerBook into the network itself, you can connect with AppleTalk Remote Access (ARA), a $199 software package from Apple that supports connection to AppleTalk by modem. (For a step-by-step guide to the installation and use of ARA, see "Remote Possibilities," *Macworld*, January 1993.) If you use ARA regularly, I recommend replacing the application in ARA with ARACommander, a $19.95 program from Trilobyte Software (513/777-6641). You'll still need ARA's drivers, but ARACommander features a simpler interface than ARA; and ARACommander uses just 48K of RAM, compared with 230K for ARA.

The ARA license allows installation on up to three Macintoshes. The most common setup links a remote PowerBook (the ARA client) with an office-based Macintosh (the ARA server). Both Macs need a modem with a CCL (connection control language) script for ARA that is 9600 bits per second or faster; 2400-bps modems are too slow.

If you are traveling, will the server Macintosh be turned on when you dial in? You can leave a server on continuously, if you don't mind wasting electricity. Running a IIci with a color monitor around the clock instead of 40 hours a week adds about an extra $135 a year to your electric bill. In the future, desktop computers with an automatic sleep mode will solve this problem. With today's computers, you need to install a power switch that you can trigger remotely by phone. The $199 PowerSwitch LT from Radiant (415/296-8040) is a remote switch built into a LocalTalk node. When triggered by a ringing signal on the phone line, the PowerSwitch can start any desktop Mac—whether it's keyboard-driven or has a built-in power switch. With a single phone call, you can have multiple PowerSwitches on the network selectively turn on other Macs and peripherals.

If you need control over only one Mac, try the simpler PowerKeyRemote ($49; Sophisticated Circuits, 206/485-7979). It can start any keyboard-driven Mac, but for Macs that don't start from the keyboard you also need a $119 PowerKey. The PowerKey products aren't networkable, so you cannot selectively control which devices are turned on.

While ARA runs in the background, a server Mac can be used for normal operation; it can even be used for a second telecommunications process (except another ARA session)—if equipped with two modems and a NuBus board that provides additional serial ports, such as a QuadraLink board from Applied Engineering (214/241-6060, 800/554-6227). The standard QuadraLink board costs $219 (the enhanced QuadraLink DMA isn't necessary for this application). But there are some potential problems. What if the server Mac crashes? Or someone turns off its power?

One way to minimize these problems is to use a dedicated ARA node, such as the $699 LanRover/L from Shiva Systems (617/270-8500, 800/458-3550). The LanRover/L is a small box with a LocalTalk connector for the network and a single serial port for a modem. Since the LanRover/L has no storage of its own, it depends on networked Macs for setup, configuration, and data storage—at least one Mac with file sharing enabled must be running whenever someone dials in to the LanRover, so you still have to guard against inadvertent shutdowns.

Another solution is dedicating a Mac to running ARA. But how powerful would that Mac have to be? According to Shiva, a LanRover/L is equivalent to a Mac IIci for network performance. But for most situations, a cheaper Mac will probably suffice as a dedicated ARA node. And a dedicated Mac offers some additional flexibility for setup and security: it doesn't need a monitor or keyboard after setup; you can configure it from another Mac with Farallon's Timbuktu (see "Grabbing a Computer"). But any desktop Mac takes up much more space than a LanRover/L.

For a large network with many users, several people may need to connect remotely to the network at the same time. None of the methods described above support multiple simultaneous remote connection. You could simply add ARA nodes, but the cleaner solution is a remote network server, a network node that supports multiple ARA sessions simultaneously. All the currently available remote network servers use Ethernet. (A multiport remote network server for LocalTalk should be available later this year.) The

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Grabbing a Computer

When you connect to another Mac via AppleTalk you can view and copy files, as long as file sharing has been set up. You can also launch applications across the network, but be prepared for speed problems because many programs are disk intensive. If your network connection is made via ARA, programs will run even more slowly.

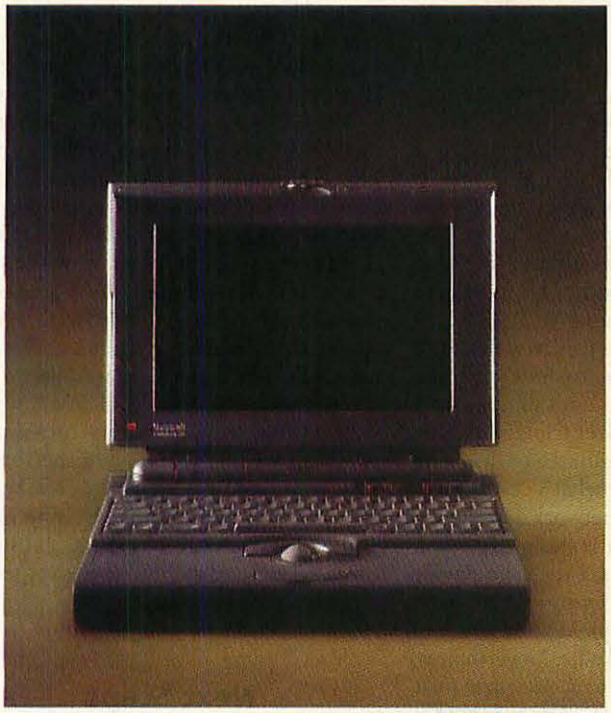
Another potential problem in launching applications across the network is that your PowerBook probably won't have the same resources as a desktop Mac. A Mac used for graphics applications, for example, will have many fonts and other system resources that may not even fit on your PowerBook's hard drive. Even if you have the disk space, downloading and installing all those resources is a tedious process that you may then have to undo for the next job.

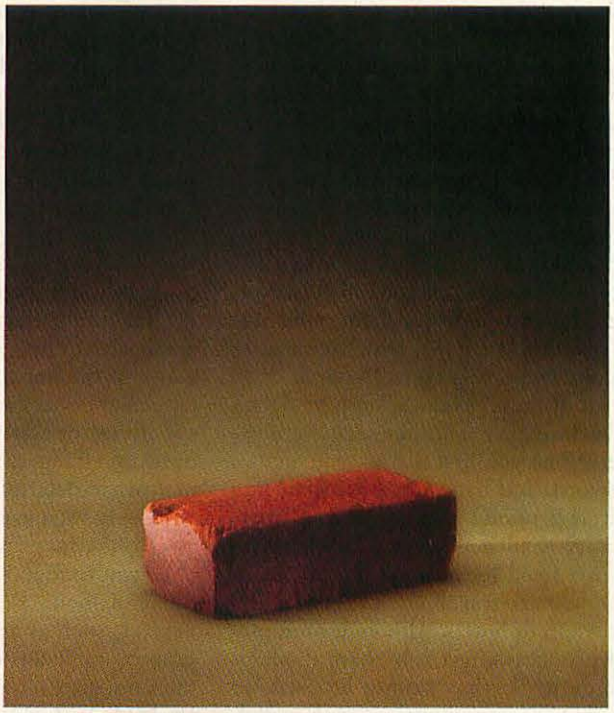
A better alternative is to operate the desktop Mac by remote control—and you can do it through a network. Both Timbuktu (Farallon, 510/814-5000) and ScreenLink (DataWatch, 919/490-1277) allow screens—and files—to be shared across a network so one Mac can control another, complete with keystrokes and mouse commands.

Timbuktu supports color screens (not important for most PowerBook users), and Timbuktu for Windows lets you share screens and transfer files with a PC running Microsoft Windows. ScreenLink lacks color support and has no Windows version.

To run Timbuktu or ScreenLink, you simply install files into the System folder of the two computers. After you start Timbuktu or ScreenLink and select the remote computer, you get a scrollable window of the remote computer's screen—just as if you were sitting in front of it. The process is a little slow with LocalTalk and especially ARA, but if you need to check, modify, or print a file, using one of these products still beats launching an application across a network.

Timbuktu (Mac or Windows) costs $199 for one copy (you need at least two copies) or $999 for a ten-pack; ScreenLink costs $99.95 for a twin-pack.





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$1445 GatorLink from Cayman Systems (617/494-1999, 800/473-4776) has 3 serial ports for modems, the LanRover/E from Shiva comes in 4- and 8-port versions ($1999 and $2999). The Rand E ($1299–$1399) from Focus Enhancements (617/938-8088, 800/538-8865) is an Ethernet ARA node with 3 serial ports. If you need more ARA ports, you can buy several of these units and stack them in any combination; they all fit into standard 19-inch racks. Or you can get a NetBlazer ($2299–$8000; Telebit, 408/734-4333, 800/835-3248), which comes in versions supporting up to 26 ports.

All of these products support ARA's callback feature, another security measure. When you first dial in, you enter a password, and hang up. ARA dials you back at a phone number stored in its memory. Callback works fine when you are in a fixed location; it doesn't work when you are traveling and staying at a succession of hotels. Although multiple-port products effectively share modems on a network, they cannot be used for general telecommunications such as dialing in to online services; this should change with software updates. The single-line LanRover/L lets anyone on the network dial out to online services.

Choosing Devices

IF YOU CONNECT YOUR POWERBOOK TO different networks—either directly or remotely—you'll encounter some problems and pitfalls not faced by permanent network residents. Each time you switch networks you have to change the printer selection through the Chooser; on a large network with many zones and printer choices, this process is especially slow. Connectix's CPU version 2 makes this easier by remembering your printer choice for each network you connect to.

For most printing jobs, changing the Chooser selection suffices, but not always—some applications need to know the type of printer as well as its print capabilities. For example, one printer might be a standard 300-dpi PostScript printer able to print a halftone at 53 lines per inch; a second printer might have PhotoGrade and print halftones at 106 lpi. When you switch printers, you may have to change these settings within the application to get the best results.

Apple's Chooser displays a flat listing of all network zones and devices—fine for small networks, but tedious with large ones. And the Chooser's view of network zones is created when it's launched, a static view that remains for however long you are connected to the network. If the network changes—if someone plugs in a PowerBook or connects via ARA—you won't see the change.

You can avoid these nuisances by installing Silver Cloud from AG Group (510/937-7900, 800/466-2447), a Chooser replacement that sells in multiple-user packs beginning at $495 for 25 users. Especially practical for PowerBook users who must access different networks, Silver Cloud organizes zones hierarchically, using a display method similar to System 7's, including alias support. A network administrator or a user can create custom views of the network to show only the particular devices and zones suitable for a specific use or user. Silver Cloud can track network changes, regularly polling the network to determine what's connected.

Using a standard network device such as a PostScript printer is straightforward, once you've found it via the Chooser or Silver Cloud. But many serial port devices, such as a StyleWriter or label printer, aren't networkable. Nevertheless, there are several ways to access them over an AppleTalk network. Apple includes GrayShare with its LaserWriter Select 300 and StyleWriter II. ShadowWriter ($109, Gizmo Technology, 510/623-7899) enables sharing of other Apple QuickDraw printers and includes many printing features such as notification when a print job is done. For sharing label printers and modems as well as printers, try ShadowLAN from Applied Engineering ($109). As a general-purpose program, ShadowLAN lacks the printer-oriented features of ShadowWriter.

If you do a lot of interactive work on a network, synchronizing all the clocks will help. NetTime ($69 for two users, $299 for ten users; Jeddak, 408/894-6900, 800/982-6900) can synchronize all Macintosh clocks over a network—including connected PowerBooks—through the server Mac. A NetTime-equipped PowerBook resets its clock whenever it connects to the network, whether by direct connection or by ARA.

Large Networks

POWERBOOKS CAN CONNECT EASILY TO any of the major PC networks. Novell NetWare, Banyan VINES, Microsoft LAN Manager, and Windows NT all offer support for Mac clients—either as a built-in feature or with optional software.

You can also connect to a NetWare server through NetMounter, part of Dayna Communications' DOS Mounter Plus ($99.95 per user, 801/269-7200, 800/531-0600). Or you can connect as a PC client with Universal SoftPC ($325) and SoftNode ($199) from Insignia Solutions (415/694-7600, 800/848-7677).

Another way you can connect a PowerBook to almost any PC network is through Personal MACLAN Connect (PMC), a $199 program from Miramar (805/966-2432). PMC is a Windows program that runs on a DOS machine connected to a PC network. With the addition of a LocalTalk board, the DOS computer can be connected with up to ten Macs. The Macs require no special software—they remain AppleShare nodes rather than becoming clients of the PC network—but they can share files on the PC network through PMC. PMC works with LANtastic, Windows for Workgroups, Invisible LAN, and other small-scale networks, as well as with NetWare, VINES, and LAN Manager. The more ambitious MacLAN Connect ($695) turns a dedicated PC into a gateway to the same types of networks.

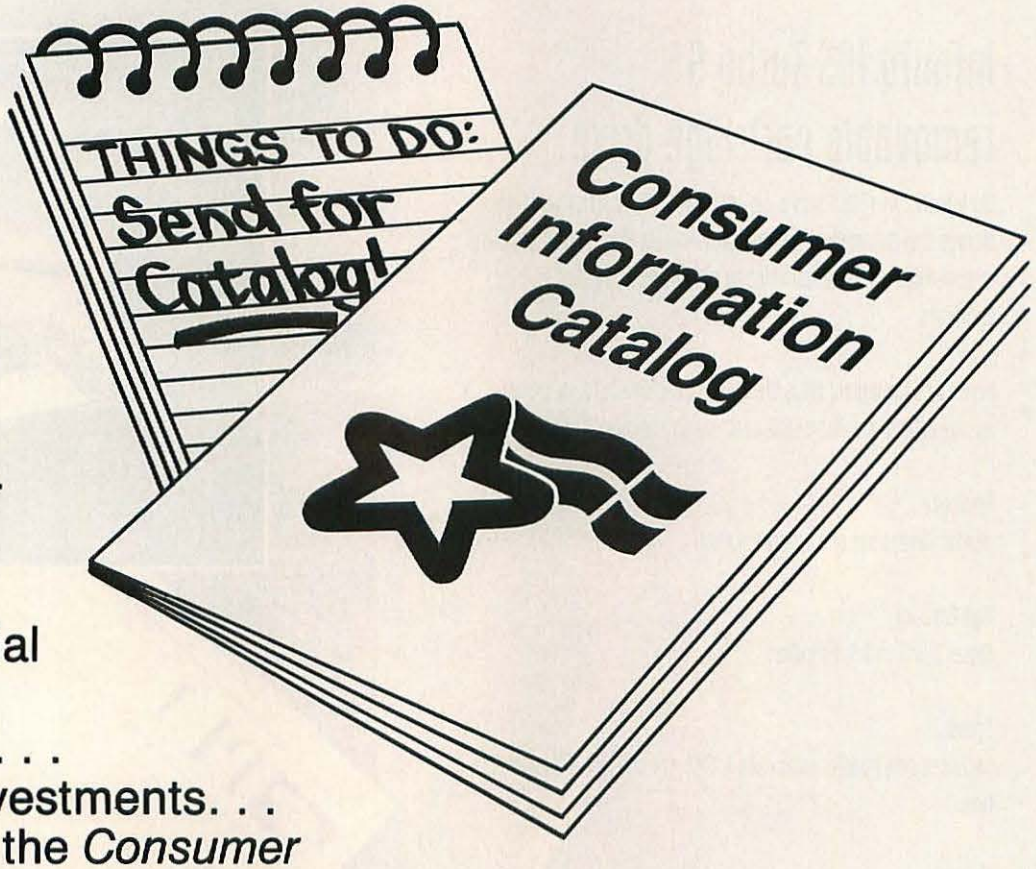
Next Steps

DESPITE ALL THE CONFUSION AND COMplexities involved in connecting a PowerBook to a network, some improvements are on the horizon. Today, ARA establishes connections for AppleTalk only. In the near future, point-to-point protocol (PPP) will enhance dial-up communications. PPP is a communication protocol standard that will do for serial connections what Ethernet does for network wiring. PPP will support multiple transport protocols—AppleTalk, TCP/IP, Novell's IPX, and others. Developed by a committee of companies that produce network products, PPP embeds unique network-protocol identifiers in data packets that enable you to connect to your network—regardless of its network operating system—through a modem.

Suppose all PowerBooks came equipped with an infrared transmitter and receiver. You would walk into the office and connect your PowerBook to the network by infrared beam, and you wouldn't have to fuss with cables and adapters. The Collaborative Mac, a tiny infrared LocalTalk transceiver powered through any Mac's ADB port, will make this possible; Photonics Corporation (408/370-3033, 800/628-3033) plans to offer it this year. To use one, you'll need a second transceiver plugged into the wired network through a PhoneNet connector. The price has not been set; it should be in the few-hundred-dollar range. ■

CARY LU is a *Macworld* contributing editor and author of *The Apple Macintosh Book* (Microsoft Press, 1992).

Put Our List On Your List



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Edited by Wendy Sharp

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★★★★★ Best ... ★ Worst

Software

ACCOUNTING/FINANCE

★★ **Andrew Tobias' TaxCut for Macintosh, MECA Software, 203/256-5000, $79.95.** The occasionally awkward interface of this personal tax-preparation software doesn't follow every Mac standard, but the help system is very good. State versions are available for California and New York. **May 93**

★★★★ **BestBooks 1.0, Teleware, 201/586-2200, $99.** In a straightforward, unintimidating manner, this small-business accounting program integrates the standard bookkeeping functions of accounts receivable, accounts payable, and general ledger. There's little to criticize, except the weak documentation. **Jul 93**

★★ **Business Sense 1.6, Software Developers Consortium, 801/288-2216, $199.** Competent, single-user, all-in-one bookkeeping package will adequately help you keep the books for a small company, but it's not as easy to use as its competition. **Feb 93**

★★★★ **Components 1.0, Satori Software, 206/443-0765, $795 per module.** Simple, flexible architecture sets a new design standard for Macintosh accounting software, but is not without its bugs and flaws. **Sep 92**

◩ **Great Plains Accounting 6.0 (6.1), Great Plains Software, 701/281-0550, $795.** High-end bookkeeping software offers a first-rate lineup of dedicated modules. Different individuals or groups can easily use the various accounting functions.

★★★ **Job Cost/Time Billing 1.05 (1.06), Satori Software, 206/443-0765, $1495.** Professional billing software incorporates high-end job-cost and accounts-receivable features in one module, plus an excellent report function; but confusing elements, minor bugs, and inaccuracies in the documentation are weaknesses. **Aug 92**

★★★ **MacInTax 1992, ChipSoft, 619/453-8722, $79.95.** It's difficult to correct your errors when using this personal tax-preparation software, but it's definitely easier than doing your taxes by hand. The display is attractive, the program supports electronic filing, and there are 15 state-tax versions available. **May 93**

★★★★ **Managing Your Money 5.0, MECA Software, 203/256-5000, $79.95.** An already strong financial-management program becomes easier to use and slightly more powerful with this upgrade. **Jan 93**

◩ **MYOB 3.0, Teleware, 201/586-2200, $149.** A file-cabinet metaphor makes the interface of this accounting package easy to use and understand. For an accounting system with one user who has no need for payroll capabilities, it's the best choice.

◩ **Quicken 3.0, Intuit, 415/852-9696, $69.95.** Track assets, liabilities, income, and expenses with this personal-finance package. It has a good Mac interface and is easy to learn and use.

★★★★ **Timeslips III 2.1, Timeslips Corp., 508/768-6100, $299.95.** Complexity is the price you pay for this time-billing utility's impressive flexibility. Fortunately, thorough documentation, excellent tech support, and default settings help any user get started. **Sep 92**

★★★ **WealthBuilder 2.0, Reality Technologies, 800/346-2024, $79.99.** Financial-planning software forces you to think about your money and helps you develop an investment plan. It's a good program for beginning investors, but more-sophisticated investors will want more-advanced features. **May 93**

BUSINESS TOOLS

★★★ **4D Server 1.0.1, ACI US, 408/252-4444, three users $1495, six users $2495, ten users $3495.** Database server uses the ingenious multitasking technology built into 4D to make it appear that each client has the full resources of the server. If you use 4D on a network, you need this product. **Jun 93**

★★★★ **4th Dimension 3.0.1, ACI US, 408/252-4444, $895.** Multitasking, which greatly improves speed in a carefully designed application, makes this upgraded relational database delightful for both developers and end users. For a relational database, it's impressively easy to use. **Apr 93**

★★ **AccuZip6 1.5.2, Software Publishers, 714/846-1908, $899.** Professional-level mail-list management tool on CD-ROM is the most comprehensive system available, but its messy documentation and inexcusable user-interface violations make our reviewer reluctant to recommend it. **May 93**

★★★★ **Atlas Pro 1.0.6 (2.0), Strategic Mapping, 408/985-7400, $795.** Although this mapping software is not a complete geographic-information system, it boasts a rich feature set and a competitive price. **Nov 92**

★★★ **Bar Code Pro 1.0 (1.3), Synex, 718/499-6293, $450.** Easy-to-use desk accessory creates bar codes in EPS or PICT for use in desktop publishing or labeling programs. It does well what it sets out to do, but lacks automatic sequential coding and fails to catch invalid characters. **Sep 92**

★★★★ **DeltaGraph Professional 2.01 (2.03), DeltaPoint, 408/648-4000, $295.** A smooth interface and outstanding technical support are only two of the stellar features in this graphing and charting program. This upgrade adds 13 new chart types and a number of presentation capabilities. **May 92**

★★★★ **Fair Witness 1.1 (1.2.1), Chena Software, 215/770-1210, $295.** A valuable tool for planning any project, this software coherently integrates outlining, information charts, scheduling, and time charts. **Oct 92**

★★★ **FASTAT 2.0, SYSTAT, 708/864-5670, $495.** Statistical business-analysis software makes sense as a day-to-day statistics tool for business or scientific users. It provides the right statistical tests for most requirements, and its graph types provide plenty of information, although they lack glamour. **Jun 93**

★★★★ **FileMaker Pro 2.0, Claris Corp., 408/727-8227, $399.** Easier scripting, improved mailing labels and text-handling, and support for QuickTime and Apple events are the major new features of this upgraded, multiuser, flat-file database. Although it has some minor bugs, this is a strong upgrade to an excellent program. **Jan 93**

★★★ **FlowChart Express 1.0 (1.01), Kaetron Software Corp., 713/890-3434, $149.** Inexpensive, easy-to-use flowchart software readily meets the needs of most flowchart creators, although those with extensive requirements will need a larger, more powerful feature set. **Jan 93**

★★★★ **GeoQuery 3.02, GeoQuery Corp., 708/357-0535, $395.** Gain geographic perspective with this custom-map generator and data-analysis software that uses zip codes to create "pushpin" maps of files from your spreadsheet or database. **Nov 92**

★★★★ **GraphMaster 1.31a (1.34), Visual Business Systems, 404/956-0325, $195.** Excellent general-purpose charting and graphing program offers a number of unusual features, including pictographs and

continues

MACWORLD

Star Ratings

360-degree free rotation. A frequent inability to undo actions is the only serious irritation. **May 92**

★★★ **Helix Express 1.0, Helix Technologies, 708/205-1669, $439.** One of the most distinctive database products ever developed, this relational database has an iconic programming language that sometimes baffles traditional database programmers, but provides an easy route into basic data-handling chores for nonprogrammers. Helix Express is still the ultimate in multiuser simplicity for relational databases. **Jul 93**

★★★ **ithink 2.2.1, High Performance Systems, 603/643-9636, $695.** Although it requires a real training commitment for effective use, this product is an attractive dynamic business modeling system. It's a good bet for identifying cloudy spots in the crystal ball. **May 93**

★★★★ **Lotus 1-2-3 for Macintosh 1.0 (1.1), Lotus Development Corp., 800/343-5414, $495.** Spreadsheet program from the other side holds its own against Mac competitors. Its many strengths include graphing, well-implemented linking, compatibility with the DOS version, and an outstanding Help system. **Apr 92**

★★★ **MacBarcoda 2.24, ComputaLabel, 508/462-0993, three-code version $349; single-code professional version $495; six-code professional package $895.** Compact, simple-to-use desk accessory creates bar codes in either EPS or Adobe Illustrator 1.1 format. DA cannot automatically create serial codes. **Jun 93**

★★★ **MacProject Pro, Claris Corp., 408/727-8227, $599.** If you're working on a midsize project and like using PERT charts (where tasks appear in boxes and are connected by straight lines), this may be the project-management software for you. However, the multistep scheduling process and the limited integration between charts are frustrating if you prefer Gantt charts. **May 93**

★★★★ **Microsoft Excel 4.0, Microsoft Corp., 206/882-8080, $495.** Create impressive spreadsheets with this upgrade that includes all the features you wished for and more. It's slower, and needs 2MB of RAM for practical use, but almost all users will want to upgrade. **Oct 92**

★★★★ **Microsoft Project 3.0, Microsoft, 206/882-8080, $695.** An amazing range of functions, including new scheduling and formatting, are packed into this project-management software. The improved tool bar helps novices schedule tasks with push-button ease. **Jan 93**

★★★ **Microsoft Works 3.0, Microsoft, 206/882-8088, $249.** Capable but unspectacular upgrade delivers marginally improved functionality and a welcome face-lift to this integrated program, but there are a number of incompatibilities, odd design choices, and performance flaws. **Feb 93**

★★★★ **nuBase Pro 1.5 (1.7), Tactic Software Corp., 407/832-1400, $395.** Although still slower than FoxBase and without the rich feature-set of 4th Dimension, this is the only relational database that makes it possible for users with no programming experience to design a useful database. **Sep 92**

★★ **Office Wiz 1.1 (1.1.4), Oryx Associates, 415/563-9971, $595.** 4D-based program attempts to integrate calendar, project, and contact management, as well as simple accounting for a multiuser environment, but the complexity of the interface requires a substantial investment in start-up time. **Nov 92**

★★★ **Omnis 7 1.1, Blyth Software, 415/312-7100, $1250.** The plain, businesslike functionality of this database-development system produces solid applications without much fuss. **Dec 92**

★★★ **OrgChart Express 1.0, Kaetron Software, 713/890-3434, $279.** Organization-chart software links a database to standard box-drawing functions. Although the learning curve is steep, the effort may be worth it for people who regularly work with large or complex organization charts. **Apr 93**

★★★★ **Panorama 2.0 (2.1), ProVue Development Corp., 714/892-8199, $395.** Disarmingly easy-to-learn flat-file database is full of labor-saving data-entry features, plus it boasts a remarkable macro function that lets you record and play back almost any series of database routines. **May 92**

★★★ **Perspective 1.5, U.S. Data on Demand, 800/352-7352, $129.95.** The level of detail and comprehensive information in this collection of U.S. demographic and economic data is impressive, and the reasonable price puts it within reach of even the smallest business. **Sep 92**

★★ **PowerPlay 1.0 (1.1), Cognos, 617/229-6600, $695.** A good program for a very limited range of business-analysis tasks. The views of data and graphs are small and manageable, and the program tabulates them in several colorful ways. **Aug 92**

★★★ **SpreadBase 1.0.1, Objective Software, 415/306-7410, $695.** Powerful business data-analysis tool is a unique combination of database and spreadsheet functions. It's worth a close look for power users, despite meager documentation and a cranky macro language. **May 93**

★★★ **Wingz 1.1ae, Informix Software, 913/599-7100, $399.** If you want a low-overhead spreadsheet with advanced-math functionality, this is an attractive product. What you get is a competent calculating engine with superior charts; what you miss is outlining, real 3-D spreadsheet linking, and the host of third-party add-ons offered for Microsoft Excel. **Jul 93**

★★★ **WordPerfect Works 1.2, WordPerfect Corp., 801/225-5000, $249.** A very good word processor, a spreadsheet, a database, charting, drawing, painting, and communications make up the seven well-integrated and flexible modules of this program. It has a few shortcomings, including some memory-management problems, but buyers should generally be pleased. **Jun 93**

COMMUNICATIONS/NETWORKS

★★★ **A/UX 3.0, Apple Computer, 408/996-1010, $795.** Hybrid–operating-system package implements the Stone Age, type-one-line-at-a-time text interface of Unix in a way a Macintosh user might actually like. **Nov 92**

★★★★ **AccessPC 2.0, Insignia Solutions, 415/694-7600, $99.95.** Slick control over formatting multiple types of DOS media is the major advantage of this file-transfer utility. **Oct 92**

★★★ **CompuServe Information Manager 2.0.1, CompuServe, 614/457-8600, $49.95.** The goal of this product is to give friendlier information-access to CompuServe for Macintosh users. An appealing color interface and increased speed are signs of success, but there's still room for improvement. **Dec 92**

★★★ **Macintosh PC Exchange 1.01, Apple Computer, 408/996-1010, $79.** For basic file-transfer, this control panel device allowing cross-platform file sharing is fine, but it's hardly state-of-the-art. **Oct 92**

★★★ **MicroPhone II 4.0 (4.0.2), Software Ventures Corp., 510/644-3232, $295.** Refinements are evident throughout this telecommunications software's upgrade, but not everyone needs $295 worth of sophistication. The impressive scripting facility is countered by poor help features. **Jul 92**

★★★★ **MicroPhone Pro, Software Ventures Corp., 510/644-3232, $295.** Truly comprehensive telecommunications package now includes send-and-receive fax software. Although the new TCP/IP tools are complicated, the documentation is clear and precise. **Apr 93**

★★ **NetVirtual 2.0, Eclectec, 408/462-2040, $995, unlimited nodes $4985.** One-of-a-kind network-simulation product favors flexibility at the expense of usability. Only after hours of work will your simulation report anything meaningful about your network, and even then the results are difficult to analyze. **Apr 93**

NetWare for the Macintosh 3.011 (4.0), Novell, 800/638-9273, $495-1995. NetWare 3.11, an expensive but robust network operating system, runs on a non-Mac dedicated server and is complex to manage. This set of NetWare Loadable Modules lets you add Macs to a NetWare network.

★★★ **Network SuperVisor 2.0.1, CSG Technologies, 412/471-7170, $495.** Fast and accurate data collection is the strong point of this network-management utility, but the interface isn't that intuitive. **Aug 92**

★★★ **Network Vital Signs 1.0 (1.1), Dayna Communications, 801/531-0600, $449.** Fault-monitoring application continually watches selected network devices and services, monitoring specific equipment for specific errors. Unfortunately, when monitoring more than ten devices, it noticeably degrades the performance of the monitoring Mac. **Mar 93**

★★★★ **RouterCheck 2.0, Neon Software, 510/283-9771, $895.** Keep your finger on the pulse of router configurations and internet traffic with this network-administration utility. It's a must for midsize or larger internets, but too pricey for small networks. **Oct 92**

★★ **SoftPC with Windows, Insignia Solutions, 415/694-7600, $499.** The emulation of a complete and accurate Windows environment on a Mac is an amazing accomplishment, but the product is so slow, even on a Quadra, that it performs in what might best be characterized as a dreamlike languor. **Jun 93**

★★★★ **TechWorks Net Utilities 1.0, Technology Works, 512/794-8533, $129.** Collection of five separate applications provides essential network-monitoring tools at a price that would please anyone. **Dec 92**

★★★★ **Timbuktu 5.0.1, Farallon Computing, 510/814-5000, single user $199, multiuser $999 to $5500.** By letting one computer (a Mac or a Windows-based PC) control, observe, or exchange data with another computer, this terminal-emulation product allows you to use resources almost anywhere on a network. Despite minor blemishes, it's a clear winner. **Mar 93**

★★ **Vicom Terminal Emulators (4.2), Vicom Technology, 604/684-9517, $195 to $3500.** These bare-bones, British-designed terminal emulators lack many common U.S. modem configurations, but do support multiple simultaneous sessions. **Aug 92**

WhiteKnight 11 (11.14), The FreeSoft Company, 412/846-2700, $139. In the right hands, this product is the precision tool of communications software,

but it does assume familiarity with telecommunications and with programming concepts.

DESKTOP PUBLISHING

★★★ **Aldus PageMaker 4.2, Aldus Corp., 206/628-2320, $795.** Interruptible screen redraw is one of the dozens of enhancements that make this upgrade well worth its price. Even so, some of the features that users need the most—opening multiple documents, for instance—are still missing. May 92

★★ **Aldus Personal Press 2.0, Aldus Corp., 206/628-2320, $199.** Basic, inexpensive page-layout program adds features and gains strength, but is still missing elements that novice users need, such as automatic kerning. Furthermore, its software-knows-best approach to copyfitting makes manual fine-tuning difficult and is almost certain to confuse and confound beginners. Mar 93

★★★ **Apple Font Pack, Apple Computer, 408/996-1010, $99.** Apple's first collection of TrueType fonts includes only 12 fonts that haven't been available since the late eighties in the PostScript format. Still, it's not a bad deal, considering that Adobe PostScript fonts cost four times as much. Mar 93

★★★ **Expanded Book Toolkit 1.0.1, The Voyager Company, 310/451-1383, $295.** Using this hypermedia publishing program, average mortals can create highly functional multimedia books in a fraction of the time it would take to do the job unassisted. Be aware, though, that it's no QuarkXPress. Jun 93

★★★★ **Fontographer 3.5 (3.5.1), Altsys Corp., 214/680-2060, $495.** Versatile tools that enable you to edit PostScript typefaces or create your own are the highlight of this font-design software. But beware, some processes are technical and cumbersome. Nov 92

★★★ **Lazy Dog Foundry Personal Font, Lazy Dog Foundry, 612/291-0306, $199.99, full 180-character set $499.99.** Type 1 font made from your handwriting has clean, even lines—whether or not your writing does. Apr 93

★★★ **LetraStudio 2.0, Letraset USA, 201/845-6100, $249.** Precise, intuitive control over character spacing and shapes, as well as a straightforward interface, make this program a great choice for manipulating type, but it lacks flashy effects, such as gradient fills. Oct 92

★★ **MacQuill 1.0, Nest Software, 408/441-1944, $99.95.** Friendly, inexpensive page-layout program is missing basic features, such as kerning and importing, and suffers from some bugs and deficiencies, but for simple word processing and grass-roots page layout it's serviceable. Aug 92

★★★★★ **Multiple Master Myriad 1.0, Adobe Systems, 415/961-4400, $185.** Elegant execution and functional design combine in this two-axis Multiple Master typeface that exceeds all previous ideas of electronic font perfection. Jul 92

★★★ **Personal Font, Signature Software, 503/386-3221, $179.95.** Turn your handwriting into a PostScript Level 3 or a TrueType font. The results are good, although not perfect—TrueType letters were not connected on screen, but this should be corrected with TrueType 2.0. Dec 92

★★★ **Publish It Easy 3.0, Timeworks, 708/559-1300, $199.95.** Desktop-publishing program offers writing, editing, formatting, page-layout, drawing, and painting tools with well-thought-out interface innovations, plus an excellent database manager. Unfortunately, the program is unstable and crash-prone. Mar 93

★★★★ **QuarkXPress 3.1 (3.11), Quark, 800/788-7835, $895.** Dozens of updated features and frustration-relievers in this upgrade include new palettes and preferences, better zooming, and improved text-editing and -formatting. The program, while still not perfectly behaved, is stable, well designed, and full-featured. Jul 92

★★★ **Renaissance 1.0, Eastman Kodak, 800/433-2839, $695.** A strange mixture of power and oversight, this page-design and -layout software provides several slick features, including handling multiple page sizes simultaneously, but blatantly ignores common Mac conventions, such as some keyboard shortcuts. Dec 92

★★★★ **Spectacular 1.2, FontHaus, 203/846-3087, $59.** Keep track of fonts efficiently and effectively with this type-specimen generator. Printing specimen sheets is a cinch. Jan 93

★★★★ **SuperATM, Adobe Systems, 415/961-4400, $149.** This upgrade to Adobe Type Manager lets you view Adobe-brand PostScript fonts on screen and output them at high resolutions, even when the corresponding printer fonts are unavailable. Although it has limitations, this is an outstanding advance in font technology and a tremendous value. May 93

EDUCATION

★★★★ **Algebra, Brøderbund Software, 415/382-4400, $89.95, school edition $99.95.** Interactive, imaginative math tutorial is keyed to the standard textbook order of topics, but offers much more. It is particularly strong on word problems and graphing. May 93

★★★ **The Castle of Dr. Brain 1.0, Sierra On-Line, 209/683-4468, $49.95.** After applying for a job as a lab assistant with the local mad scientist, use logic and raw brain-power to navigate a series of rooms, mazes, and hallways on the way to your interview. Puzzles range from simple and mundane to creatively laborious. Dec 92

★★ **Comprehensive Review in Biology, Queue, 203/335-0908, $295.** There isn't a textbook publisher in North America with the nerve to publish a black-and-white biology book with nothing more than text and basic line drawings, much less charge several hundred dollars for it, but that, in effect, is what this CD-ROM is. May 93

★★★ **Compton's Multimedia Encyclopedia 1.00M, Compton's New Media, 619/929-2626, $795.** The down-to-earth writing style and numerous bells and whistles of this multimedia encyclopedia on CD-ROM appeal to younger readers, but the high cost and sluggish performance may be prohibitive. Apr 93

★★★★ **Decimal & Fraction Maze 1.2, Great Wave Software, 408/438-1990, $69.95, bilingual version $89.95.** Education software weaves the threads of eight math curricula—from third grade to eighth, along with two levels of adult education—into an interesting and visually stimulating game. Jul 93

★★ **Dvorak on Typing 1.0, MacPlay, 714/553-3530, $49.95.** Typing tutor offers solid lessons, but the small annoyances, such as never being able to take intermediate or advanced lessons without first passing a test, add up. Jun 93

★★★ **Eco-Adventures in the Ocean, Eco-Adventures in the Rainforest 1.0, Chariot Software Group, 619/298-0202, $59.95.** Explore the ocean or rainforest while avoiding pitfalls and predators in these educational adventure games. Imaginary landscapes that combine features found in different environments may confuse some students. Nov 92

★★★ **Headline Harry and the Great Paper Race 1.0, Davidson & Associates, 310/793-0600, $59.95.** Travel through time and across the country as a journalist in this history/geography game. While not an educational masterpiece, it is lots of fun. Dec 92

★★★ **MacGlobe 1.3.0, Brøderbund Software, 415/382-4400, $44.95.** Besides maps and bits of fun, such as national anthems, this geography software offers an impressive quantity of demographic and economic information. While it could stand some improvement in data export, it provides a fascinating intellectual adventure for home and school use. Feb 93

★★★★ **Mavis Beacon Teaches Typing 2.0, The Software Toolworks, 415/883-3000, $49.95.** If being entertained while learning to type interests you, this typing tutor provides varied environments, interesting lessons, and good games. Jun 93

★★★ **Millie's Math House, Edmark Corp., 206/556-8400, $49.95.** Early math-education software provides a variety of ways for preschoolers to experiment with numbers and counting. It's entertaining and engaging, but more advanced levels and more flexibility would keep children challenged longer. Jul 93

★★★★ **The New Grolier Multimedia Encyclopedia, Grolier Electronic Publishing, 203/797-3530, $395.** The remarkably current and scholarly text of this encyclopedia on CD-ROM is suitable for sophisticated readers, while its speed, ease of use, and value are impressive. Apr 93

★★ **NihongoWare, Vol. 1, Qualitas Trading Company, 510/848-8080, $349.** Although this Japanese language CD-ROM offers solid instruction, it's so expensive and so limited in its word selection that it's not an economical choice for individual users. Jan 93

★★ **Picture It 1.0 (1.4), Penton Overseas, 619/431-0060, $69.95.** If you add custom word lists, this interactive French-English picture dictionary may serve as a decent aid to a more complete curriculum, but it's buggy and of uneven quality. Aug 92

★★ **The Secret Codes of C.Y.P.H.E.R. 1.0 (1.1), Tanager Software Productions, 510/430-0900, $59.95.** Intriguing facts about mammals and a variety of alphabets provide the interest in this educational game, but the inescapable, repetitive animations are a major detraction. Apr 93

★★★ **The Secret Island of Dr. Quandary 1.0 (1.01), MECC, 612/569-1500, $49.95, teacher's edition $69.95.** Clever package of gorgeous landscapes, catchy sounds, and tempting arcade-game puzzles uses math, logic, and reading skills. Although somewhat slow, it's fun for parents and kids. Jun 93

★★★ **Stickybear's Reading Room 2.2a, Optimum Resource, 803/785-7441, $59.95.** Educational game with four different activities takes a sedate but direct path to building primary-level reading skills. It's appropriate for ages four to eight, but probably too juvenile for older kids. Jun 93

★★★ **Time Treks 1.0, Earthquest, 415/321-5838, $59.95.** An eccentric archaeologist opens portals

continues

MACWORLD

Star Ratings

through time, and you must close them in this educational, HyperCard-based game. Slow response time and limited animation and color are somewhat disappointing, but overall it's a fun way to browse through history. **Sep 92**

★★★★ **Transparent Language 1.04M, Transparent Language, 603/465-2230, $139.** Without an iota of glitz or glamour (no sound, graphics, color, or buttons), this foreign-language reader is a superb tool for bolstering language skills through reading. **Oct 92**

★★★★ **Where in America's Past Is Carmen Sandiego? 1.0 (1.3), Broderbund Software, 415/382-4400, $44.95.** Travel through time and the U.S. chasing those V.I.L.E. crooks in this clever educational history/geography game that's challenging for all ages. **Mar 93**

★★★★ **Where in the World Is Carmen Sandiego? Deluxe Edition, Broderbund Software, 415/382-4400, $59.95.** The V.I.L.E. gang is at it again, stealing famous objects and fleeing to locations around the world. In this deluxe version of the well-known geography game, there are more crooks, more clues, and more countries to visit. **Oct 92**

ENTERTAINMENT

★★★ **4-D Boxing 1.0, Electronic Arts, 415/571-7171, $49.95.** Authentic motion and multiple viewing angles are the best features of this entertaining boxing game, but off-disk copy protection, geometric figures, and the inability to save games in progress make it less enticing. **Sep 92**

★★★★ **A-Train, Maxis, 510/254-9700, $69.95.** Charming railroad simulation offers astonishing, and often witty detail, but the learning curve is high and the interface isn't completely Mac-like. **Apr 93**

★★ **America Alive, MediaAlive/CD Technology, 408/752-8500, $99.** QuickTime movies, color photographs and maps, text, and audio mingle in this multimedia CD-ROM guide to the United States. It's a promising concept, but it doesn't yield much useful information. **Mar 93**

★★★★★ **Arthur's Teacher Trouble, Broderbund Software, 415/382-4400, $59.95.** Every page of this delightful animated book is dense with surprises that arouse and satisfy a child's curiosity. In the words of six-year-old Alex, "It's like chocolate ice cream. You can have it more than once and it's still good." **Apr 93**

★★★ **Audioshop 1.0 (1.05), Opcode Systems, 415/856-3333, $69.95.** Audiophiles will get a kick out of applying sound effects to any sound file on their Macs. You can also control the order of songs or sounds on an audio CD played on a CD-ROM player. A number of quirks may confuse new users. **Sep 92**

★★★ **Battle Enhanced Chess CD ROM, Interplay Productions, 714/553-6678, $79.95.** Elaborately detailed cartoon characters act out little dramas of strategy and capture, complete with sound effects, in this chess game that will drive nine-year-olds mad with glee but may annoy experienced chess players. **Mar 93**

★★★ **The Battle of Britain, Deadly Games, 215/295-2284, $39.95.** It's August 10, 1940. The badly outnumbered British must defend their country against the invading Luftwaffe, and you're in charge. Although the graphics and sound are not spectacular, this is an entertaining, thinking person's game. **Dec 92**

★★★ **Blade 1.1 (2.0), Leviathan Corp., 313/826-3560, $99.95.** Surreal graphics in this fantasy martial-arts game are spectacular—a cross between Dali and Seuss—but the arcade action is extremely difficult to master. **Sep 92**

★★★ **Capitalist Pig 1.0 (1.02), Pluma Software, 602/969-9441, $59.95.** Terrorist attacks, embezzlement, fires—keeping a cool head is half the challenge if you are to become successful in this business-simulation game. No clear end point means that getting rich, retiring, and writing novels is not an option. **Sep 92**

★★★ **Cogito 1.0, Inline Design, 203/435-4995, $59.95.** Rubik's Cube fans will like this challenging game where the goal is to replicate a pattern by moving rows and columns of tiles. The deviously simple twist is that clicking on the arrows that control movement results in reactions that are more and more complex as you progress through the 120 levels. **Apr 93**

★★★ **Cyberblast 2.01, Innerprise Software, 410/560-2434, $49.95.** Aliens have overrun the 64 levels of Fastrax Labs, and it's your job to get rid of them in this arcade game. While it's not the most unusual game in the universe, it's a nice, basic shoot-'em-up, with clever execution and appealing graphics. **Sep 92**

★★★★ **Go Master 5, Toyogo, 802/464-5526, $69.** Go has been called the most interesting board game ever invented. This excellent software version incorporates helpful learning aids and sample games. **Dec 92**

★★★★ **Hellcats Over the Pacific 1.0.3, Graphic Simulations, 214/699-7400, $69.95.** Fly a WWII-era Navy fighter, the Grumman F6F Hellcat, against enemy planes in the South Pacific with this flight simulator that offers smooth graphics, good special effects, and great documentation. **Apr 93**

★★★★ **Insanity 1.0, UV Wave, 318/868-9944, $39.95.** Shoot your Mac with this cool control panel device that offers a choice of nine weapons, ranging from an Uzi to a pigeon. It has first-rate sound effects and detailed animation, but the novelty wears off. **Feb 93**

★★★★ **Jewelbox 1.5, Varcon Systems, 619/563-6700, $49.95.** This gem of a game is strongly reminiscent of Tetris. The jewels fall into rows that disappear when you place three jewels of a kind together. **Jun 93**

★★★★★ **Just Grandma and Me, Broderbund Software, 415/382-4400, $49.95.** Mercer Mayer's Little Critter comes to life in this charming, captivating, wondrously entertaining, interactive storybook on CD-ROM. **Aug 92**

★★★ **Kid Pix Companion, Broderbund Software, 415/382-4400, $29.95.** Addition to Kid Pix adds clever new features, including the world's easiest-to-use QuickTime movie and presentation modules, but it's less appealing than the delightfully simple original. **Oct 92**

★★★★ **Maelstrom 1.03, Ambrosia, P.O. Box 23140, Rochester, NY 14692-3140, $15 plus $5 shipping and handling.** Fast-paced arcade game is loosely modeled after Asteroids, the Atari classic. Maelstrom features superb animation, hilarious sound effects, exciting action—and best of all, it's shareware. **Jun 93**

★★★★ **Monkey Island 2: LeChuck's Revenge, LucasArts Games, 415/721-3394, $59.95.** This whimsical Twilight Zone of life on the high seas is the adventure-game equivalent of *Mad* magazine, filled with witheringly sarcastic dialogue, splendid gross-out jokes, heapings of self-parody, and enough hilarious detail to keep you amused for days. **May 93**

★★★ **Mozart: The "Dissonant" Quartet, The Voyager Company, 310/451-1383, $59.95.** This CD-ROM includes an unusual essay on the anatomy of stringed instruments, brief discussions of general musical concepts, an analytical overview of the quartet, and a taped minilecture on Mozart's life, but sadly enough the music is limited almost entirely to the title piece. **Apr 93**

★★ **The Orchestra: The Instruments Revealed, Warner New Media, 818/955-9999, $79.98.** The many-branched, interwoven hypertext style of this music-education CD-ROM makes the program hard to navigate and digest, despite its richness. For the price, other music-education CD-ROMs present better values. **Apr 93**

★★★★ **Poetry in Motion, The Voyager Company, 310/451-1383, $29.95.** Performance videos of contemporary poets are juxtaposed with the texts of their poems and taped interviews in this intriguing CD-ROM that combines the excitement of the stage with the reflective appeal of the page. **Feb 93**

★★★★ **Prince of Persia, Broderbund Software, 415/382-4400, $49.95.** A high tolerance for frustration is necessary to negotiate the 12 mazelike levels of dungeon and palace in this arcade adventure, but amazingly realistic (although gory) animation, stunning graphics, and entertaining challenges make it worthwhile. **Sep 92**

★★★ **Red Baron 1.0, Dynamix, 800/326-6654, $69.95.** The romance of history and the realism of a flight simulator combine in this World War I flight game. Despite small annoyances, including too many dialog boxes to get to the simulation, this game will charm any aspiring ace. **Nov 92**

★★★★ **Richard Strauss: Three Tone Poems, The Voyager Company, 310/451-1383, $59.95.** *Don Juan, Till Eulenspiegel,* and *Death and Transfiguration* are the three works included in this CD-ROM, with a program written by Russell Steinberg. The musical analysis is satisfying and the lush orchestral music will appeal to both novice and experienced classical music listeners. **Apr 93**

★★★ **Rodney's Wonder Window, The Voyager Company, 310/461-1383, $39.95.** Collection of 23 colorful, wacky graphics and animations by Rodney Alan Greenblat is charming but uneven. The overall look is surreal and cartoonish, but while some modules are elaborate and sophisticated, others are simple and not particularly interesting. **Mar 93**

★★★ **Schubert: "The Trout" Quintet, The Voyager Company, 310/451-1383, $59.95.** Alan Rich, classical music commentator for National Public Radio, conveys his enthusiasm for this appealing music in this CD-ROM's lively text. However, the discussion is relatively unchallenging and the musical performance, though well regarded, is not at the top of most reviewers' lists. **Apr 93**

★★★★ **The Secret of Monkey Island 1.0, LucasArts Games, 415/721-3300, $59.95.** A genuinely amusing, interactive tale of swashbuckling and daring deeds using splendid 256-color graphics and an original soundtrack. Low screen resolution and irksome copy protection only slightly spoil the delight. **Sep 92**

★★ **Sherlock Holmes, Consulting Detective 1.0, Icom Simulations, 708/520-4440, $69.95.** Accompany Sherlock Holmes and Watson as they investigate three CD-ROM–based mysteries. Primarily made up of video scenes, this game's only slightly more interactive than TV, and the picture's not as good. **Aug 92**

★★★ **Sherlock Holmes, Consulting Detective, Volume II, Icom Simulations, 708/520-4440, $69.95.** Match wits with the legendary detective by solving three difficult mysteries in this CD-ROM game. **May 93**

★★★ **SimLife, Maxis, 510/254-9700, $69.95.** A megalomaniac's dream come true, this amazingly intricate simulation game lets players create and control ecosystems. It's not easy, but the reward is an increased understanding of the complex interrelationships of life. **Feb 93**

★★★★ **So I've Heard, Volume 1: Bach and Before, The Voyager Company, 310/451-1383, $24.95.** Engaging text by classical-music critic and lecturer Alan Rich describes nearly two millennia of western music (up to the mid-eighteenth century) in this CD-ROM. It offers a unique and affordable opportunity to sample 50 or so performances, styles, and compositions. **Feb 93**

★★★ **Space Quest 1: Roger Wilco in the Sarien Encounter, Sierra Online, 209/683-8989, $19.95.** As Roger Wilco, starship janitor, you must defeat the evil Sariens in this adventure game where your head is more important than your hands. Puzzles range from the obvious to the head-scratching, but for most players the game will be easy to complete. **Apr 93**

★★★★ **Spaceward Ho 2.0.1 (3.01), Delta Tao Software, 408/730-9336, $59.** A happy planet is a profitable planet in this absorbing, humorous strategy game of interstellar capitalism and imperialism. **Aug 92**

★★★ **Super Mines 1.0, Callisto Corp., 508/655-0707, $49.95.** You use logic to search a minefield without setting off mines in this fast-paced game that's easy to learn, but offers 84 levels for long playability. **Apr 93**

★★★★ **Super Tetris, Spectrum HoloByte, 510/522-3584, $49.95.** Teensy tiles are a minor negative in this exceptional tile game that's more varied, more challenging, and more forgiving than the original. **Oct 92**

★★ **Surgeon 3, The Brain 1.0 (1.1), ISM, 410/560-0973, $59.95.** Surgical-simulation game with realistic graphics and sound can be entertaining and educational, but it's overly intolerant of mistakes—not for the faint of heart or the easily frustrated. **Sep 92**

★★★ **Warlords, Strategic Studies Group, 904/494-9373, $49.95.** A medieval fantasy world is the setting for this colorful game of strategy and conquest with beautiful graphics. Unfortunately, the computer opponents are not challenging enough for an experienced war-gamer, although human opponents may be. **Dec 92**

★★★★ **Who Killed Sam Rupert, Creative Multimedia Corp., 503/241-4351, $39.99.** You're a police detective trying to solve the murder of a popular restaurateur in this interactive CD-ROM that exploits the full range of multimedia options and provides a wealth of clues and surprises to hold your interest. **May 93**

GRAPHICS

★★★ **Adobe Dimensions, Adobe Systems, 415/961-4400, $199.** This three-dimensional-effects utility may seem very limited, with white-only light and no surface texturing, but it's a ground-breaking product. It performs its 3-D illusions within the object-oriented, resolution-independent world of PostScript and is an excellent tool for anyone who works extensively in Adobe Illustrator or Aldus FreeHand. **Apr 93**

◩ **Adobe Illustrator 3.01 (3.23), Adobe Systems, 415/961-4400, $695.** Adept transformation and reshaping capabilities and superb text-handling stand out in this object-oriented illustration program. It also includes features found in no other Macintosh draw program, such as tools to create line and bar graphs.

★★★★ **Adobe Photoshop 2.5, Adobe Systems, 415/961-4400, $895.** No graphics program is as universally loved and as downright deserving of user loyalty as this one, but while this upgrade builds on the program's wide range of capabilities, it ignores some minor weaknesses that have begun to peek through the product's armor. It's still great but perhaps not perfect. **Jun 93**

★★★ **Aldus FreeHand 3.1 (3.11), Aldus Corp., 206/628-2320, $595.** A pressure-sensitive freehand tool is the most remarkable new feature of this updated drawing program. Substitution for missing fonts is another good addition, but skimpy text-editing tools and incomplete support for EPS continue to diminish its value. **Jun 92**

★★★★ **Alias Sketch 1.5, Alias Research, 416/362-9181, $995.** The enhanced modeling and revamped rendering capabilities of this 3-D illustration program contribute to a tremendous and reliable upgrade, a heartening example of a company listening to its users and delivering on its promises. **Jul 93**

★★★★ **ArchiCAD 4.02 (4.1.21), Graphisoft USA, 415/737-8665, $4450.** The simple yet powerful 3-D interface in this CAD package builds on a construction metaphor. The integrated product incorporates most of the features an architect needs. **Jun 92**

★★ **ArtBeat Professional 1.0, Pie Practical Solutions, 201/902-9500, $249.** Despite a smattering of unique capabilities, this inexpensive draw and paint program lacks many of the features of equivalent programs. **Apr 93**

★★★ **artWorks 1.0, Deneba Software, 305/596-5644, $149.** If you're expecting a graphics dynamo, this combination paint and draw program will leave you a little cold. But despite its flaws, it ranks as one of the best graphics programs available under $200. **Jun 93**

★★ **AutoCAD Release 11, Autodesk, 415/332-2344, $3500.** Customizable, bare-bones drafting upgrade partially implements a graphical user interface. Few add-ons are currently available. **Dec 92**

★★★★ **Blueprint 4.0, Graphsoft, 410/461-9488, $295.** Entry-level 2-D drafting program is a wonderful antidote to the complicated CAD system blues. Don't be misled by the low price; this full-fledged drafting package is powerful enough to serve professionals who appreciate the value of simplicity. **Jul 93**

★★★ **CA-CricketDraw III 1.0, Computer Associates International, 408/432-1727, $249.** Although not revolutionary, this draw program boasts some original implementations, including dramatically improved gradations. **May 92**

★★★ **Cachet 1.0 (1.2), Electronics for Imaging, 415/742-3400, $595.** The tools, interface, output, and documentation of this color-image editor are all quite impressive for a first version, but serious failings include slowness and disappointing sharpening. **Dec 92**

◩ **Canvas 3.0 (3.0.6), Deneba Software, 305/596-5644, $399.** Discovering the complex nuances of this draw program's immense feature list isn't easy, but it's well worth the effort. The precision drawing functions in particular should appeal to many users.

★★★ **Color It 2.0.1, Timeworks, 708/559-1300, $299.95.** Overpriced color paint program has a full range of painting and image-retouching capabilities, including 15 levels of undo and an impressive magic-wand tool, but its naming conventions are bewildering. **Apr 93**

★★ **CPM Graphic Tutor 1 & 2, Caseys' Page Mill, 303/220-1463, $489 per volume.** Although some neophytes may find these CD-ROM tutorials on Adobe Illustrator and Adobe Photoshop helpful, the programs' distracting interfaces, inconsistent execution, lack of polish, and high price weigh strongly against them. **May 93**

★★★ **DesignCAD 2D/3D 3.0.1 (4.0), DesignCAD, 918/825-4848, $499.95.** Despite slow rendering, this general-purpose 3-D modeler with 2-D drafting capabilities represents a price and performance breakthrough in 3-D modeling programs. **Nov 92**

★ **Easy Color Paint 3.0, MECC, 612/569-1500, $59.95.** For a program that purports simplicity, this color paint program is anything but. Possibly the weakest, least intuitive paint program for the Mac, it's unnecessarily complex and frustrating. **Jul 93**

★★★★ **ElectricImage Animation System 1.5.1, Electric Image, 818/577-1627, $7495.** The most powerful animation program for the Mac improves its documentation and rendering, and adds an intuitive project window that allows you to control all aspects of animation from a single location. Unfortunately, it still retails for the price of a European vacation for two. **Feb 93**

★★★★ **Fractal Design Painter 2.0, Fractal Design Corp., 408/688-8800, $399.** If you can put up with a few inconveniences and surprises, this color paint software will earn your admiration. It provides the real meat-and-potatoes tools required by professional artists, and many of its functions—natural media brush tools, the color-sensitive magic wand, 2-D lighting effects—are entirely without peer. **Jul 93**

★★ **Image Assistant 1.0, Caere Corp., 408/395-7000, $495.** Besides unsatisfactorily addressing Adobe Photoshop's small list of liabilities, this image-editing software is barely able to keep up with less expensive bitmap editors. Problems include an unforgivable lack of antialiased text, no selective revert function, and an incorrectly implemented smudge tool. **Apr 93**

★★★★ **Infini-D 2.0 (2.5), Specular International, 413/549-7600, $995.** Rich combination of 3-D modeling, rendering, and animation tools at a relatively affordable price. Visualization program works well, offers a nicely integrated approach to rendering, and is generally stable. **Jan 93**

★★★★ **IntelliDraw 1.0, Aldus Corp., 206/628-2320, $299.** Crowd-pleasing features such as physical and dynamic links make this automated draw program a great environment for planning and presenting, although it's less satisfying as a free-form drawing tool. **Nov 92**

★★★★ **Kai's Power Tools Volume 1 1.0, HSC Software, 310/392-8441, $149.** Photoshop plug-ins include image-editing filters; texture, gradient, and fractal generators; and special-effects tools. Although at times monstrously complicated, this collection represents a virtually infinite supply of visual resources. It's an amazing tool that no regular Photoshop user should be without. **May 93**

◩ **MacRenderMan 1.0 (1.3), Pixar, 510/236-4000, $695.** This dedicated renderer provides an extremely sophisticated, albeit sometimes difficult, way to generate 3-D images. Currently the most widespread rendering scheme, it uses algorithms to create textures, bumps,

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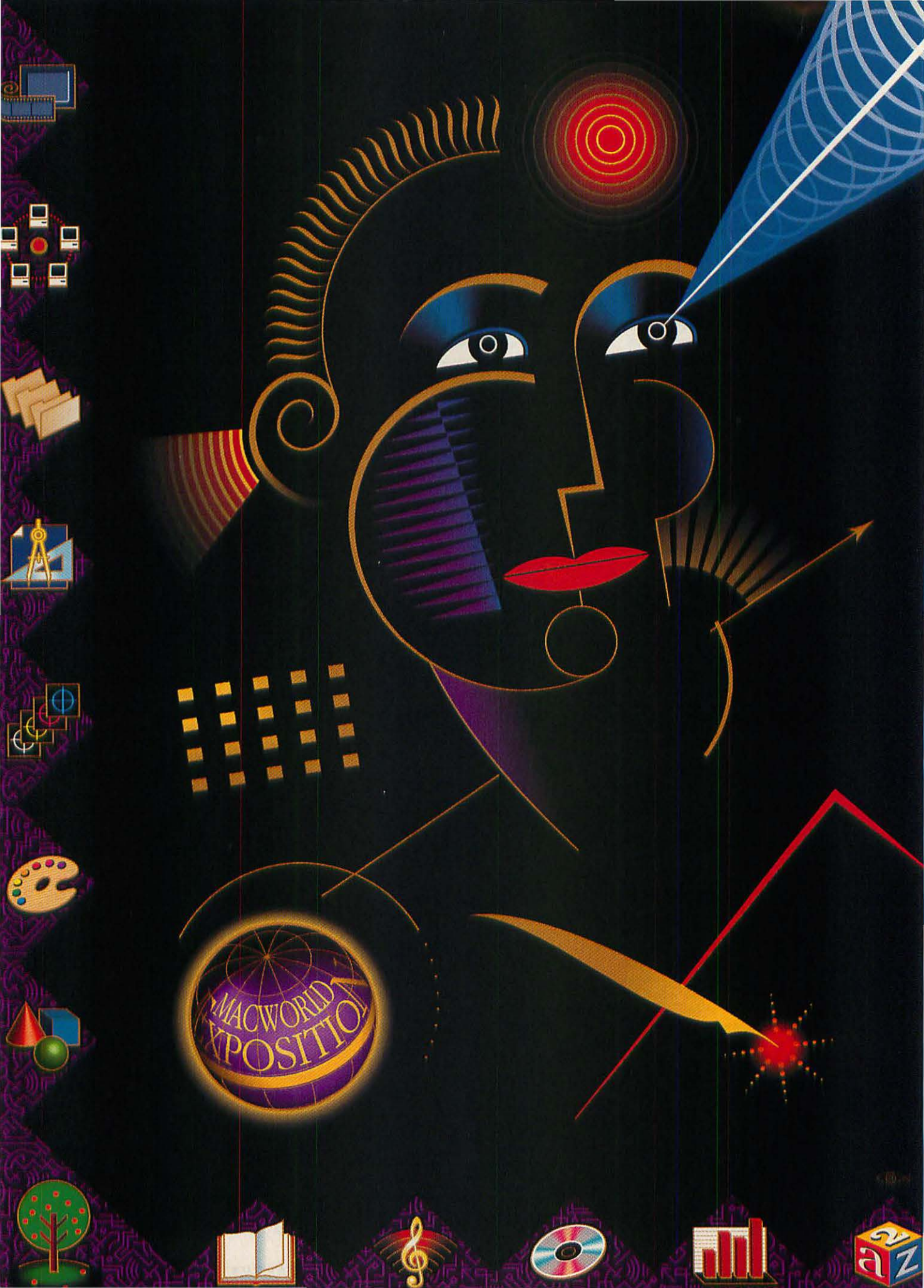
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MACWORLD

Star Ratings

lights, fog, and practically every other element of an image.

★★★★ **MiniCAD+ 4, Graphsoft, 410/461-9488, $795.** Professionals should be delighted with this highly competent CAD package's evolution into 3-D. It has maintained its features-champion status and is easier to use. Mar 93

★★★ **Ofoto 2.0, Light Source Computer Images, 415/461-8000, $395.** Many new features—notably color support—have been added to the already impressive toolbox of this scanning software. It often produces good results, but it rarely produces the best scan possible for a given image and output method. Jul 93

★★★★ **Paint It 1.0, Timeworks, 708/559-1300, $59.95.** Straightforward color paint program lacks image-editing tools but has a versatile cast of selection and painting tools—and it's priced to sell. Apr 93

★★★★ **Ray Dream Designer 2.02 (2.06), Ray Dream, 415/960-0765, $299.** Experienced 3-D aficionados will find this 3-D–imaging software a welcome addition to their arsenal, and beginners may find it ideal for the leap from two dimensions to three. Improved text-handling and viewing capabilities would make it even better. Sep 92

★★★★ **Sketcher, Fractal Design, 408/688-8800, $149.** A variety of effects reproduce styles and techniques of traditional drawing tools with this wonderful gray-scale paint and image processing program. Feb 93

★★★★ **Smoothie 1.02, Peirce Software, 408/244-6554, $149.** Create smoother screen images with this handy utility that antialiases the edges of on-screen artwork. Although it can't accommodate sound or accept imported QuickTime movies, it's a must for anyone who uses a Mac for presentations. Nov 92

★★ **StrataType 3d 1.0 (2.0), Strata, 801/628-5218, $199.** The rulers, texture palette, custom bevels, and canned positioning schemes of this 3-D type-effects software are nice, but they can't compare with the animation skills, single-character positioning features, lighting capabilities, and superb rendering of other available programs. Mar 93

◩ **Swivel 3D Professional 1.0 (2.0.4), Macromedia, 415/252-2000, $695.** Relatively unusual cross-sectional technique makes this 3-D modeler a great tool, especially for fast prototyping. It provides a quick and easy way to create a variety of shapes.

★★★ **Tree, Onyx Computing, 617/876-3876, $295.** Single-purpose program generates lifelike color drawings of trees from a number of easily controlled parameters. Although visually appealing, it's an expensive way to draw a tree. May 93

★★★ **Typestry 1.0 (1.1), Pixar, 510/236-4000, $299.** Type enters the third dimension with this reasonably priced 3-D typographic effects and animation program. There's room for improvement, but it's an exciting tool for designers, multimedia producers, and those who enjoy working with type. Nov 92

★★★ **Virtus WalkThrough 1.1.3, Virtus Corp., 919/467-9700, $495.** Interactive 3-D modeling tool provides instantaneous access to rendered 3-D scenes, allowing you to travel through models at will. While it has some problems (such as occasionally just quitting), it's an excellent value that may change both how you design and how you think about design. Jul 93

★★ **Zeus 0.91 (0.94), Delta Tao Software, 408/730-9336, $499.** Color paint program tries hard to match capabilities found in more expensive programs, but not always successfully. It's brimming with good ideas that are poorly implemented. Aug 92

MATH/SCIENCE

★★★ **Caduceus Physics 1.0, Scientia, 617/776-3427, $130.** Giant HyperCard stack consists of carefully indexed cards covering small conceptual bites of physics; it's the first in a series of programs designed to prepare students for the Medical College Admissions Test (MCAT). Jan 93

★★★★ **Data Desk 4.0 (4.1), Data Description, 607/257-1000, $595.** For finding patterns in data, this statistical-analysis program has no peer. Years of refinement have made it a unique, and uniquely valuable, tool for analysis, despite its lack of some tests found in larger programs. May 93

★★★ **Expert Astronomer 1.0 (1.1), Expert Software, 305/567-9990, $49.95.** Draw maps of the sky from any location in the Solar System and learn about celestial objects with this astronomy software. Most effective in color, this is a great educational tool for beginners and a reference database for experts. Dec 92

★★★★ **Expressionist 3.0 (3.01), Prescience Corp., 415/543-2252, $199.95.** If you work regularly on similar topics, you can customize this equation-writing software to produce equations with exactly the appearance you want, letting you work at amazing speed. Mar 93

★★★★ **HiQ 1.0 (2.0), Bimillennium Corp., 408/354-7511, $995.** A script language, which exhibits an endearing nonchalance about data structures and typing of variables, is only one of the impressive features of this formidable numerical mathematics software. Oct 92

★★★★ **Interactive Physics II 1.0 (1.01), Knowledge Revolution, 415/553-8153, $399.** Motion simulation software is an improvement over traditional classroom instruction in physics. This new version greatly expands the range of problems that can be solved, and adds support for QuickTime. Dec 92

★★★★ **MacBreadboard 1.1 (1.13), Yoeric Software, 919/644-1620, $59.95.** Useful educational engineering software simulates with excruciating detail every aspect of a digital integrated-circuit breadboard trainer. It accurately replicates and even surpasses the behavior of a physical breadboard—without burning out IC chips. Dec 92

★★★★ **MacPhase 1.2, Otter Solutions, 315/768-3956, $159.** Low-cost, scientific-data-visualization software with a large assortment of mathematical tools is one of the few authentic bargains in science software. One of its principal strengths is a well-planned color lookup table editor that's delightfully easy to use. May 93

★★★★ **Maple V, Brooks/Cole Publishing, 800/354-9706, $493.95.** For functional scope and ease of use on a basic Mac (such as a Classic or Plus), this symbolic math software has no competitors. May 92

★★★ **MathCAD 3.1, MathSoft, 617/577-1017, $495.** Numerical and symbolic computation software is easy to learn, easy to use, produces good reports, and is much more powerful than earlier versions. It still doesn't compete in scope with the largest math programs, but for most science and engineering tasks, it's a fast way to get problems solved. Jun 93

★★★★ **MathType 3.0, Design Science, 310/433-0685, $199.** This equation-writing software makes automatic typographical decisions, which is helpful if you produce documents on a wide range of subjects. Its smooth integration with Microsoft Word is also convenient. Mar 93

★★ **NueX 1.1 (1.3), Charles River Analytics, 617/491-3474, $295.** Lightweight introduction to artificial neural networks and knowledge-based expert systems has some merit, but cannot be considered a serious production tool. Oct 92

★★★★ **Sequencher 2.0 (2.0.8), Gene Codes Corp., 313/769-7249, $2200.** While not implementing everything a DNA researcher could want, this software for manipulating DNA-sequence information does provide the things a researcher really needs. The single best feature is its raw speed. Dec 92

★★★ **SigmaPlot for the Macintosh 4.11, Jandel Scientific, 415/924-8640, $495.** This scientific graphing software offers a short path from raw data to publishable graphs. The Mac fundamentals need polish, but the program offers unique analytic capabilities. Jul 92

★★★ **Simulink 1.2, The MathWorks, 508/653-1415, $3995.** If you hear the word *Bode-plot* several times a week at work, this math-simulation software is designed to make your life wonderful. Little glitches and a command-line orientation are drawbacks. Dec 92

★★★★ **Spyglass Dicer 2.0, Spyglass, 217/355-6000, $695.** Scientific 3-D visualization tool displays a two-dimensional slice through a three-dimensional object (which is represented in the computer by a data table). While Dicer pushes the limits of the Mac hardware, for its function this product is really the only game in town. Jul 93

★★★ **StatView 4.0m, Abacus Concepts, 510/540-1949, $595.** A nice mix of statistical prowess and operating convenience distinguish this statistical-analysis and presentation software. The printing options are outstanding. Nov 92

★★★★ **Theorist 1.5, Prescience Corp., 415/543-2252, $449.95.** Symbolic-mathematics program that you can figure out by yourself adds a useful table feature, more special functions of physics, and better graphics. Plus, it's still the only program to use real notation directly. May 93

★★★★★ **Voyager II, Carina Software, 510/352-7328, $159.95.** If a brilliantly-lit, star-filled sky holds more than a moment's fascination for you, you need to know about this astronomy program. In a firmament of mostly faint and forgettable astronomy software, it's a supernova. Jul 93

ORGANIZATION/PRODUCTIVITY

★★ **ACT 1.0 (1.01), Contact Software International, 214/919-9500, $395.** While this contact manager has several laudable features, such as customizable contact views and an integrated word processor, learning how to use it is a frustrating experience. Feb 93

★★★ **Active Memory 2.0, ASD Software, 714/624-2594, $199.** Personal organizer distinguishes itself by providing strong network support, although it may be overkill for a lone user. Aug 92

★★★★ **Agent DA 2.0 (2.1.3), TeamBuilding Technologies, 514/278-3010, $99.** Simple, flexible calendar/reminder program includes every obvious calendar function—easy navigation, extensive print options, adjustable displays, recurring events, and even a straight-

forward manual. Sep 92

★★★ **Amaze Daily Planners: Cathy, The Far Side, Word-A-Day (2.0/1993), Amaze, 206/820-7007, $69.95.** A cartoon (or word) a day makes scheduling more fun with these icon-based calendar/daily planners, but the graphics take up a lot of hard drive space, and the programs must be running in order for alarms to sound. Sep 92

★★ **Connections 2.1, Heizer Software, 510/943-7667, $199.** A wider range of scheduling features, new printing options, and improved networking capabilities don't change the fact that this HyperCard-based personal information manager is just too slow. Nov 92

★★★★ **DateBook 1.5.1 (1.5.li), After Hours Software, 818/780-2220, $125.** Personal time manager offers a flexible approach to event scheduling and to-do-list management. This upgrade adds new features and fixes bugs that plagued the first version. Feb 93

★★★★ **DayMaker 2.0 (2.03), Pastel Development Corp., 212/941-7500, $129.95.** If you need to organize lots of disparate information, follow up on meetings with many people, keep track of your own calendar, create an archive of completed work, and print out lists of to-do items to take on the road, this free-form personal information manager is a great choice. May 93

★★★ **Dynodex 3.0, Portfolio Software, 408/252-0420, $89.95.** The speed and printing options of this field-based address-book manager are its strengths, but this upgrade adds welcome improvements to the interface, including automatic formatting of phone numbers. Apr 93

★★★ **EasyAlarms 2.0.3 (2.1), Essential Software, 619/481-1477, $99.** Complex, flexible calendar, reminder, and to-do list program includes scripting and sound recording among many other features. Nov 92

★★ **Hello, Atelier Systems, 619/453-4300, $99.** Unusual combination of contact management and word processing in a compact package. This first release is hampered by several notable flaws, such as text documents that must be linked to a contact name. Jan 93

★★★★ **Inspiration 4.0, Inspiration Software, 503/245-9011, $295.** Watch your ideas evolve in a dynamic diagram mode and a text-based outline mode with this brainstorming tool. It works best as a vehicle for organizing and developing ideas. Feb 93

★★★ **Intouch 2.0.4, Advanced Software, 408/733-0745, $99.95.** Free-form database is a fast and easy way to manage contact information. Program offers flexible data entry instead of automatic formatting. Although this version adds a handy reminder system, it falls short as a calendar planner. Feb 93

★★★ **LapTrack For the Mac 1.0b, Timeslips Corp., 508/768-6100, $79.95.** Time- and expense-tracking program offers the right features for the on-the-go professional, but the interface is overcomplicated and the documentation is sloppy. Still, in spite of its flaws, it does an excellent job. May 93

★★★ **Nolo's Personal RecordKeeper 3.0, Nolo Press, 510/549-1976, $34.96.** Hierarchically configured database organizes your personal affairs, including legal matters, financial records, insurance plans, family history, and more, but it is frustratingly inflexible. Jan 93

★★★★ **Now Up-to-Date 2.0, Now Software, 503/274-2800, $99; five-user version $449; ten-user version $799.** Calendar utility combines flexibility, ease-of-use, and streamlined operations in an almost irresistible package. The Reminder control panel, while a great new feature, has had minor conflicts. Jun 93

★★★ **Office Manager 2.1 (2.5), White Crow Software, 800/424-0310, $99.** Simple contact- and project-management software is powerful for small databases, but reliance on HyperCard limits its usefulness for low-end Macs. Dec 92

★★★★ **Spiral 1.0 (1.02), Technology Works, 512/794-8533, $129.** Designed specifically for taking and organizing notes, this product provides an excellent feature set, including tabs, bookmarks, and an option for automatically expanding abbreviations, but it's marred by some annoying errors in the editing and import/export processes. Mar 93

★★ **TimeVision 1.0, Powercore, 815/468-3737, $99.** New scheduler with notepad and card-file functions tacked on has some worthwhile features, but in general doesn't match up to the competition. May 93

★★★ **TouchBase 2.0 (2.0.1), After Hours Software, 818/780-2220, $125.** Entering data is quick and easy, and there are lots of useful printing options, but this personal information manager displays a few rough edges, such as not allowing you to copy the information in the Record Summary field. Aug 92

PRESENTATION TOOLS

★★★★ **Action 1.0 (1.02), Macromedia, 415/252-2000, $495.** Entry-level multimedia integration program offers, for its price, a rich selection of features, including an excellent variety of transitions as well as gradient and patterned backgrounds. It makes producing presentations with sound and motion surprisingly easy. Feb 93

★★★★ **Adobe Premiere 2.0 (2.0.1), Adobe Systems, 415/961-4400, $695.** A dream command post for video professionals, this QuickTime movie-editing software produces stunning special effects with little effort. Only the program's appetite for memory, disk space, and computer horsepower prevent it from being the nonprofessional's dream as well. Jan 93

Aldus Persuasion 2.1 (2.12), Aldus Corp., 206/628-2320, $495. For slide presentations, this product provides an all-in-one studio where each element—outline entries, slides, notes, handouts, and charts—is dynamically linked to the others. It offers layered builds and automated templates, and has a proven track record.

★★★★ **CameraMan 1.0 (1.1), Vision Software International, 408/748-8411, $149.** If you need to record continuous screen operations, this screen recorder is the best deal around. It handles 32-bit QuickDraw, takes advantage of QuickTime's long list of compression and playback capabilities, and even uses custom frame sizes. Sep 92

★★★ **Cinemation 1.0, Vividus Corp., 415/494-2111, $495.** Easy-to-use program merges animation, interactivity, and presentation features, but image- and text-handling capabilities are less than stellar. Jul 92

★★ **Comet CG 1.0.3, MSI, 317/842-5097, $995.** Program for generating antialiased test over live video is reasonably priced compared with dedicated graphics systems, but you're likely to be as astonished by its limitations as you are impressed by its capabilities. It offers too few formatting options, a cumbersome interface, and an insubstantial manual. May 93

★★★ **DiVA VideoShop 1.0, DiVA Corp., 617/491-4147, $599.** Instantaneous playback sets this graceful QuickTime editing software apart. Its simple beauty is slightly offset by a few rough edges, a lousy manual, and an occasionally clumsy interface. Jul 92

★★★ **Hi Rez Audio Volume 1.0, Presto Studios, 619/689-4895, $149.95.** The enjoyable, high-quality music on this CD-ROM adds a nice touch to presentations. The software for browsing the music is quirky, and the product could use some documentation. Jul 93

★★★ **Interactive Training for Director 1.1, Media In Motion, 415/621-0707, $199.** This somewhat expensive program teaches basic Macromedia Director skills and provides a foundation for exploring Director's other features. It has a clear, often lighthearted approach, but navigating the lessons can be frustrating. Jun 93

★★★ **Macromedia Director 3.1 (3.1.1), Macromedia, 415/252-2000, $1195.** This minor update to a powerful and versatile multimedia authoring tool adds 23 scripting commands, QuickTime importing and editing, and a utility that compiles movies into a faster playback format—but the whopping $149 addition to the price makes it an upgrade most users can afford to miss. Feb 93

★★★ **Media-Pedia Video Clips, Media-Pedia, 617/235-5617, VHS $195; S-VHS, Hi8, and 3/4SP $295; BetaCamSP $495.** Fifty-seven minutes of stock footage for use in QuickTime movies includes over 150 different segments, ranging from unremarkable to dramatic to genuinely funny. Apr 93

★★★★ **Microsoft PowerPoint 3.0, Microsoft, 206/882-8080, $495.** This remarkable upgrade puts this presentation program ahead of the pack in terms of convenience and ease of use. Although the ready-made template collection is pretty paltry, the extensive system of master layers, reliable cross-platform compatibility, and strong on-screen presentation capabilities more than compensate. Feb 93

★★★ **Morph 1.0 (1.1), Gryphon Software Corp., 619/454-6836, $149.** With patience and practice, you can become a high-tech special-effects wizard using this image-melding movie utility that "melts" one image into another. While using it is simplicity itself, you can only morph still images, and the program suffers from some first-release glitches. Nov 92

★★ **Motion Works ProMotion 1.0 (1.03), Motion Works, 604/685-9975, $395.** Inexpensive animation program consolidates a slew of tempting features, including flexible path tools and ambitious support for Apple events, but the capabilities are strung together with a weak and problem-ridden interface. Nov 92

★★ **MovieWorks 1.1, Interactive Solutions, 415/377-0136, $395.** Over 100 bugs were fixed in version 1.1 of this multimedia authoring software that takes an all-in-one approach to creating presentations, but problems remain. For now, it's a good idea, poorly executed. Jun 93

★★★ **Passport Producer 1.0, Passport Designs, 415/726-0280, $495.** Strong timing controls and good sound capabilities mix with middling text- and image-handling and a lack of even basic animation options in this partially successful entry-level multimedia program. Apr 93

★★★ **Special Delivery 1.0 (1.1), Interactive Media Corp., 415/948-0745, $399.** While this entry-level multimedia package has all the tools you need to

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assemble interactive screen presentations that burst with motion and sound, it has a disorienting interface and lacks the polish and power of other similarly priced programs. Mar 93

★★★ **VideoFusion 1.0.1, VideoFusion, 419/891-1090, $649.** Collection of special effects for QuickTime movies may not be for the casual user, but if you have the equipment and you can't live without spinning logos and superimposed shots, then go ahead and indulge. Jul 93

PROGRAMMING

★★★ **EdScheme 3.4 (4.0), Schemers, 305/776-7376, $49.95.** This clear, elegant programming language is an excellent tool for learning good programming techniques, although it can't be used to create standalone applications. Nov 92

★★★ **EISToolKit 2.0, MicroStrategy, 302/427-8800, $1995.** Reliable, field-tested developer's environment for creating executive information systems provides automatic access to information in spreadsheets and databases across a distributed system, and serves up the information on screens that provide automatic graphing, analysis, and report generation. May 93

★★★★ **FutureBASIC 1.0, Zedcor, 602/881-8101, $299.95.** Complete, easy-to-learn, real-world programming tool has full Toolbox, System 7, and assembler support. It's a wonderful tool that's rapidly becoming a favorite among commercial developers. Jul 93

★★★ **MetaDesign for the Macintosh 3.0, Meta Software Corp., 617/576-6920, $250.** This diagramming tool for structured systems analysis offers easy ways to group and ungroup symbols in diagrams and to show relationships between symbols. It excels at austere, classic flowcharts but could use some flashier features, such as shaded backgrounds, for presentations. Mar 93

★★★ **Object Logo Student Edition, Paradigm Software, 617/576-7675, $49.95.** This book-plus-disk package offers a wide-ranging introduction to programming concepts. It's aimed roughly at the high-school educational level and lets you see something happen for every few lines of code you type. Jul 93

★★★★ **Object Master 1.0.2, ACI US, 408/252-4444, $395.** Successful combination of the superior object-management facilities typically found in Smalltalk, and a first-rate programmer's editor. Plus it works with the most popular languages: C, C++, and Pascal. Jan 93

★★★★ **PG:Pro 1.5, Staz Software, 601/225-7085, $169.** For part-time or novice programmers, the combination of these BASIC programming tools and FutureBASIC is a fast path to a working Mac program. Jul 93

★★★ **Serius Programmer 3.0, Serius Corp., 801/261-7900, $395.** The graphical interface of this application-design environment provides nonprogrammers with tools for creating custom software, but the documentation lacks critical explanations. Jan 93

★★★★ **Think C 5.0, Symantec Corp., 408/253-9600, $299.** While not a radical improvement, this is a significant upgrade to an outstanding development tool. Beginners won't find the documentation helpful. Jul 92

★★★★★ **Think Pascal 4.0, Symantec Corp., 408/252-3570, $249.** A remarkable achievement—a programming language and environment full-bodied enough for professional programmers while still inviting for neophytes. No weak points and dozens of strengths. Aug 92

★★★★ **UserLand Frontier 1.0 (2.0), UserLand Software, 415/369-6600, $249.** A robust scripting language distinguishes this ground-breaking desktop programming tool that can automate desktop functions, repetitive data-managements tasks, and more. Jul 92

UTILITIES

★★★ **7th Heaven 2.5, Logical Solutions, 612/659-2495, $99.95.** Seven enhancements to System 7 include a file-copying accelerator, a file-mapping utility, a system-information collector, a screen saver, a simple calendar, a desktop-pattern editor, and a system-alert-icon changer. Our reviewer found them fun and elegantly done, but not entirely useful. Jul 93

★★★ **Alki Seek 2.1, Alki Software Corp., 206/286-2600, $39.95.** Competent file-finding utility scans by file name or content and lets you combine multiple search criteria. It cannot search in the background or find text in compressed files. Jul 93

★★★ **ALSoft Power Utilities 1.0.1 (1.0.2), ALSoft, 713/353-4090, $129.95.** Buying this set of seven utilities is more economical than purchasing the included disk optimizer and resource manager (DiskExpress II and MasterJuggler) separately, but the other five utilities are unimpressive. Aug 92

★★★★ **At Ease 1.0 (1.1), Apple Computer, 408/996-1010, $59.** Sweet, simple, secure substitute for the Finder displays a clean, attractive page full of oversize icons where a single click launches a program or document. To delete, rename, or move files, you have to return to the Finder. Mar 93

★★★ **AutoDoubler 1.0.7 (2.0.1), Salient Software, 415/321-5375, $89.95.** Designed to operate transparently, this automatic file-compression utility is a practical solution for users short on disk space, but it's missing many of the features of dedicated file-compression utilities, and it provides only limited control over the process. Sep 92

★★★ **Billy Steinberg's PBTools 1.0.1, Inline Design, 203/435-4995, $99.95.** If you want basic PowerBook management without added frills or complex menu bar displays, this collection of four utilities may be just your cup of tea. Jul 93

★★★★ **Conflict Catcher and Other Innovative Utilities 1.0 (1.3.8), Casady & Greene, 408/484-9228, $79.95.** Enable or disable INITs and startup items when you boot, with this INIT manager that comes with four other system-related utilities. Its ability to track down INIT-related problems makes it a worthwhile investment even if you own another INIT manager. Mar 93

★★★ **Copyright, CSG Technologies, 412/471-7170, $49.** If you can justify spending $49 purely for the sake of efficiency, this straightforward utility replaces the Finder's copy function, unobtrusively copying files to or from your Mac, in the background, while you move on to more interesting things. Apr 93

★★★ **CPU 1.0j (2.0), Connectix Corp., 415/571-5100, $99.** Indispensable items mix with trivial ones in this collection of utilities for the PowerBook. It's a relatively inexpensive way to turn any PowerBook owner into a full-fledged power user. Apr 93

★★★ **DiskFit Direct 1.0, Dantz Development Corp., 510/849-0293, $49.95.** Basic but efficient backup system is simple and painless enough to foster better backup habits in anyone who uses it. It doesn't back up to hard drives or tape drives. May 93

★★★ **Drive 7 2.3 (2.34), Casa Blanca Works, 415/461-2227, $79.95.** Universal hard drive updater and formatter has an attractive, uncluttered interface that's so easy to use it makes hard drive maintenance almost relaxing. Jan 93

★★ **DynoPage 2.0, Portfolio Software, 408/252-0420, $89.95.** While this utility greatly simplifies the printing of booklets and double-sided pages, it doesn't support PostScript graphics, is incompatible with some popular applications, and has a buggy drag-and-drop feature. Jul 93

★★★★ **easyPrint 1.0, SF/O, 408/253-8081, $29.95.** Nifty utility lets you switch printers without using the Chooser. It's a bargain for network users and those who frequently change output devices. Oct 92

★★★ **Hard Disk ToolKit Personal Edition 1.1.2, FWB Software, 415/474-8055, $79.** The more arcane features of the heavy-duty Hard Disk ToolKit have been stripped out of this entry-level, non-power-user version, but everything you really need to format, update, partition, and manage your hard drive is included. Jan 93

★★★ **INITPicker 3.0 (3.02), Inline Design, 203/435-4995, $79.95.** This INIT manager's ability to load aliased INITs over a network will interest network managers. While it disables problem INITs at start-up, it doesn't help you identify the cause of INIT conflicts that don't cause the Mac to crash at start-up. Mar 93

★★★★ **Inline Sync 1.0 (1.01), Inline Design, 203/435-4995, $129.95.** Keep the latest version of your work on your portable machine and your desktop Mac with this file-sync software. It's easy to install, easy to use, easy on the wallet, and does the job well. Mar 93

★★★★ **KidDesk 1.0, Edmark Corp., 206/556-8484, $39.95.** If you have young children who love to experiment with your Mac while you're busy elsewhere, this desktop environment is a fun way to provide easily navigable play while protecting your files and applications from the havoc that curious little fingers can wreak. Jun 93

★★★ **Kiwi Power Windows 1.5 (1.5.3), Kiwi Software, 805/685-4031, $79.95.** Our skeptical reviewer found this system extension surprisingly handy. Its hierarchical menu lists all the open windows in the Finder and any applications. Jul 92

★★★ **MacPalette II 2.2 (2.3), Microspot USA, 408/253-2000, $69.** You can print images from 8-bit and 24-bit color programs when you use an ImageWriter II with a four-color ribbon and this new driver that approximates halftones by dithering. While the results are less than state-of-the-art, so is the cost. Sep 92

★★★★ **MacTools 2.0, Central Point Software, 503/690-8090, $149.** The consistent, 3-D–style interface makes it easy for the inexperienced user to navigate this utility package; the automated hard drive and floppy-disk repair capabilities and antivirus capabilities make it an asset for anyone. Oct 92

★★★★ **Magnet 1.0 (1.01), No Hands Software, 415/321-7340, $129.95.** Automation aids the laborious task of file management with this software. It creates "agents" or "magnets" that trigger in response to user-specified events and automatically look for files and folders to copy, move, or alias. Feb 93

★★★★ **MasterFinder 1.2.1, Olduvai Corp.,**

305/670-1112, $149. Ingenious finder utility provides rapid access to frequently used files and folders, permits operations on several files at once, and saves catalogs of offline volumes, but the many features require some effort to learn. Nov 92

★★★ **More Disk Space 1.1 (2.1), Alysis Software Corp., 415/566-2263, $99.95.** Automatically compress and expand files with this utility. Although it doesn't identify compressed files, and must run as a start-up application to work automatically, it does offer a measure of control that similar utilities lack. Sep 92

★★★ **NightWatch II 2.0.1b (2.01c), Kent Marsh, 713/522-5625, $159.95.** Although skillful snoops can override the screen-locker feature of this hard drive security utility, the password protection provides a flexible and safe method of restricting access to anyone turning on your hard drive. Nov 92

★★★★ **Nok Nok 1.0 (1.0.4), Trik, 617/933-8810, $49.95.** Plug the security holes that System 7 file sharing created, with this effective file-share monitoring utility that logs people's attempts to connect to your Mac, alerts you when someone does connect, and sets time limits for file share users. Oct 92

★★★ **Norton Essentials for PowerBook 1.0, Symantec Corp., 310/453-4600, $129.** Uneven collection of a dozen PowerBook utilities ranges from the unique and useful Instant Access module, which automatically turns AppleTalk on and off, to the relatively inaccurate Battery Gauge feature, which purports to tell you the status of your battery. Apr 93

★★★★ **Norton Utilities for Macintosh 2.0, Symantec Corp., 310/453-4600, $149.** Everything-including-the-kitchen-sink utility package does an excellent job of diagnosing and repairing damaged hard drives and floppy disks, but the interfaces of the various components differ wildly. Oct 92

★★★ **Peace of Mind 1.2.2, Polybus Systems Corp., 716/871-6533, $149.** Hardware diagnostic tool performs exhaustive batch, interactive, and benchmark tests on virtually all major Mac hardware components; does an excellent job of diagnosing simple simulated hardware errors (such as SIMM tweaking). The program has minor bugs and lacks a comparative test-history feature. Jun 93

★★★★ **PicturePress 2.5, Storm Technology, 415/691-6600, $199.** This image-compression software supports every useful storage mode; has new calculation features for improved image fidelity; offers utilities with practical advantages for day-to-day graphics work; and is twice as fast as version 2.0. If you work with images professionally, it's the clear choice. Mar 93

★★★ **PowerMerge 1.0.2, Leader Technologies, 714/757-1787, $129.** File-synchronization utility has a potentially confusing interface, but is a handy means of updating selected files so that different Macs end up with identical versions of the selected documents. Apr 93

★★★ **Public Utilities for the Macintosh 1.0, Fifth Generation Systems, 504/291-7221, $149.** Utility program sticks to the basics of disk diagnosis, disk repair, and file optimization. It does a good, and in some cases unique, job, although disk optimization is slow. The technical support offered by Fifth Generation is excellent. Jun 93

★★★ **RapidTrak 1.0.1, Insignia Solutions, 415/694-7600, $99.95.** If you've got RAM to spare, this hard drive formatter offers driver-level RAM caching to store frequently used data and improve performance, especially on slower-speed drives. May 93

★★★ **Retrieve It 1.0, Claris Clear Choice, 408/987-7000, $49.** It's great that this nonindexed file-finding utility allows you to search by file name as well as by text, but it is definitely slower than indexed searching. Nov 92

★★★ **Safe and Sound, Central Point Software, 503/690-8090, $49.95.** Limited but useful disk-protection and -salvage utility has a clean, simple interface and is an efficient emergency recovery tool. Jun 93

★★★ **Silverlining 5.4, La Cie, 800/999-3919, $149.** Extensive and detailed testing is only one of many advanced functions offered by this hard drive–management utility. The interface is lackluster and apt to confuse beginners. Jan 93

★★★★ **SnapBack 1.0, Golden Triangle Computers, 619/279-2100, $129.** For regular day-to-day backups, this network backup software is a great choice. Its strength lies in its simplicity and its easy-to-use, one-window interface, but it requires a dedicated hard drive. Dec 92

★★★ **SpeedyCD 1.2.2 (1.2.4), ShirtPocket Software, 602/966-7667, $70.** Get Info gets faster with this CD-ROM–access accelerator that creates a database of files from a CD and puts it on your hard drive. If you regularly browse through the same CD-ROM folders, this product might save you enough time for it to be worth the $70. Nov 92

★★★★ **Star Trek: The Screen Saver, Berkeley Systems, 510/540-5535, $59.95.** Go where no Mac has gone before with this screen saver based on the original "Star Trek." Modules vary from simple messages in "Trek"-inspired fonts to an endless parade across the ship's main screen of aliens, spacecraft, and artifacts from different episodes. May 93

★★★ **Super 7 Utilities, Atticus Software, 203/324-1142, $99.95.** Collection of seven control panels/extensions adds some ease of use to System 7, although none of its functions are essential. Modules perform tricks such as turning any menu into a tear-off palette, and randomizing the sounds that play in response to errors. Apr 93

★★ **SuperDuper 1.7, NeoConcepts, 408/899-4821, $79.** If you're sick of duplicating disks with the Finder, this utility is an acceptable alternative, but there are other utilities that are better, cheaper, and do the same thing. Nov 92

★★ **TimesTwo 1.0.1, Golden Triangle Computers, 619/279-2100, $149.** Automatic disk-compression utility operates at the disk-driver level rather than as an operating system add-on. A number of quirks, such as its ungraceful handling of full disks, are problems. May 93

★★★★ **UpDiff 1.0, KyZen Corp., 609/354-3863, $169.** Innovative program compares two versions of a file, extracts the differences, and creates a difference file that is typically smaller than the original and can be used to update the older file. Dec 92

★★★ **Voice Navigator SW 2.3, Articulate Systems, 617/935-5656, $399.** Talk back to your Mac (if it has built-in sound input) with this speech-recognition software. Defining macros that respond to voice commands can be frustrating, but the product is a real boon for disabled users. Jan 93

★★★ **WonderPrint 1.0, Delta Tao Software, 408/730-9336, $59.** StyleWriters and DeskWriters produce halftones good enough for newsletters with this printing extension that improves the output of QuickDraw printers and accelerates printing of pictures on PostScript printers. Jan 93

VERTICAL MARKETS

★★★ **Compare-A-Loan 4.0.2 (4.1), Softflair, 612/894-3357, $79.95.** Although geared to professionals, this product for home-loan evaluation provides thorough documentation and is structured so that anyone can use it. Its reports compare payback schedules of various home-loan options. Apr 93

★★ **ConstructionMac 1.2 (2.5), Revelar Software, 801/485-3291, $159.** With a lot of work from you, this software will organize your construction or remodeling project. Oct 92

★★★★ **Diet Balancer 1.0 (1.05), Nutridata Software Corp., 914/298-1308, $69.95.** Easy-to-use personalized weight-planning tool includes a database of nutritional values and standard serving sizes, and is useful for home diet-planning. Dec 92

★★★ **Expert Home Design 1.0 (1.0.3), Expert Software, 305/567-9990, $49.95.** Quickly and easily create home- or office-interior layouts that are precise, but not as detailed as blueprints, with this interior design software that includes a large furniture library. It doesn't do automatic side views, or offer ⌘-*key* access to library objects, but it's a good value nonetheless. May 93

★★ **Expert Landscape Design 1.0 (1.0.2), Expert Software, 305/567-9990, $49.95.** Barebones drawing environment for experimenting with landscape design is inexpensive, but its usefulness is severely limited because of awkward color and pattern tools and because it doesn't identify plant types. Feb 93

★★★★ **Grade Machine 5.0, Misty City Software, 800/795-0049, $79.** Teachers' lives get easier with this software that quickly sets up a useful electronic grade book. Program includes networking capabilities plus dozens of options for printing reports. Dec 92

★★★ **JobTracker 2.02 (2.5), InfoSolutions, 814/355-2983, $395 to $844.** Designed specifically for publication management, this scheduling and project-management software isn't completely polished, but it manages the job competently. Dec 92

★★★ **LoanLease Library 3.0.3 (3.05), Softflair, 612/894-3357, $99.95.** If you are generating a loan or a lease and need to keep track of payments, this well-documented program for loan evaluation is a worthwhile investment, despite its minor eccentricities. Apr 93

★★★ **Making the Grade 2.0 (2.2), Jay Klein Productions, 719/591-9815, $99.95.** The Macintosh version of the Apple II program Grade Busters 1/2/3, this grade-book software with dozens of reporting options is easy to learn; but if you're already spreadsheet-literate, the friendly dialog boxes and reminders may get in the way. Dec 92

★★★★ **Nolo's Living Trust 1.0, Nolo Press, 510/549-1976, $79.95.** Gracefully guiding users through the process of drafting a living trust, this product is carefully thought out and a great value for simple trusts. Aug 92

★★★ **Nutri-Calc Plus 1.2, Camde Corp., 602/926-2632, $159.** Designed for knowledgeable and serious users, this powerful, flexible program manages nutri-

continues

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Star Ratings

tion information and analyzes diets. Dec 92

★★★ **Stat-Ref 3.2a (3.2b), Teton Data Systems, 307/733-5494, $95.** Medical database on CD-ROM lets you search by keyword. Because it provides access to limited sets of journal citations, it's not suitable for research, but it could effectively replace a small reference library in an office. Jan 93

WRITING TOOLS

★★ **Correct Grammar 3.0 (3.6), Wordstar International, 415/382-8000, $99.** Illogical and inappropriate recommendations are a hallmark of all grammar checkers, but this one also violates Mac conventions in irritating ways. Aug 92

★★ **Correct Writing 2.0, Wordstar International, 415/382-8000, $49.** For those who are unsure of the elements of style, this online reference is convenient and comparatively inexpensive, but it is far from complete. Sep 92

★★★ **DocuComp II 1.0 (1.05), Advanced Software, 408/733-0745, $179.95.** Document-management utility compares text in two versions of the same file and reports the differences in a comprehensive, easy-to-follow format. Nov 92

★★★★ **EndNote Plus 1.2 (1.3), Niles and Associates, 510/649-8176, $249.** Reference database and tool for creating citations and bibliographies is now accessible from within Microsoft Word 5.0, a significant enhancement to an excellent product. Sep 92

★★★★ **Final Draft 2.0 (2.0.3), MacToolkit, 310/395-4242, $349.** Script-writing gets simpler with this well-conceived software that automates formatting of different elements in a script, including dialogue, action, and slug lines (scene headings). Customization is easy, and macros automate typing of common phrases such as "fade to black." Apr 93

★★★ **IdeaFisher 2.0, Fisher Idea Systems, 714/474-8111, $595.** Inspiration never comes easily, but this creativity tool with a question bank of 6000 questions and an idea bank of 61,000 words and 700,000 links might help get the juices flowing. Jan 93

★★★ **Just Joking 1.0, WordStar International, 415/382-8000, $49.** HyperCard stack of around 2800 humorous quotations offers a serviceable selection of sayings from a diverse group of humorists, comedians, philosophers, and writers, among others. Apr 93

★★★ **LetterPerfect for Macintosh 2.1, WordPerfect Corp., 801/225-5000, $149.** Stripped-down version of WordPerfect measures up as a serviceable low-end word processor, with clean, accurate documentation and an uncluttered interface. Jan 93

★★★★ **MacWrite Pro, Claris Corp., 408/987-7000, $249.** Many of the new features of this upgrade are very well executed, including the easy-to-use table feature, simple but elegant palettes, and an almost pain-free mail merge feature. The program could still use some polish, however. Jul 93

★★★★ **Microsoft Word 5.1, Microsoft, 206/882-8080, $495.** Small, solid upgrade fine-tunes some plug-in modules and adds new modules including an icon tool bar, text annotation, and other features. The numerous minor enhancements make it worth the upgrade price, but it won't give Word 5.0 users goosebumps. Mar 93

★★ **Nisus Compact 3.3 (3.31), Nisus Software, 619/481-1477, $150.** Inexpensive price and low disk-space requirements don't compensate for this word processor's many missing features, including mail merge, macros, and word count. Memory quirks are an additional problem. Aug 92

★★★ **RightWriter for the Mac 5.0, Que Software, 317/573-2500, $99.95.** Grammar checker looks at writing style, word usage, punctuation, and capitalization, as well as grammar. Customizable writing-style filters and multiple approaches to analysis are nice, but—as with all grammar checkers—not all of the program's advice is great. May 93

★★★ **ShowScape 4.1, Lake Compuframes, 914/941-1998, $429, with WordPerfect 2.0 $679.** This script-writing software formats scripts in either screenplay format or dual-column format (for audio and video) and allows you to choose the number of shots displayed per page, but it requires you to own and work in WordPerfect. Apr 93

★ **StoryLine 1.02 (1.5), Truby's Writers Studio, 310/575-3050, $295.** Frustrating and sometimes haphazard HyperCard-based program attempts to offer expert training in the craft of plot development. Aug 92

★★★ **Thunder 7 1.0.5 (1.5.2), Baseline Publishing, 901/682-9676, $99.95.** The speed, customizing options, and overall feature-set of this stand-alone spelling checker and thesaurus are admirable, but before you can trust it implicitly, it needs a dictionary with greater integrity. Jul 92

★★★ **TypeReader 1.0, ExperVision, 408/428-9988, $695.** Speed and accuracy combine with a straightforward operating style in this high-end OCR software that doesn't do everything its competition does, but is a major contender nonetheless. Feb 93

★★★ **VersionMaster 1.5, AStar Technologies, 508/486-8532, $199.95, five users $799.95, ten users $1199.95.** Document-management utility helps you archive and track versions of a file by maintaining a database of altered documents. It's recommended only for workgroups that routinely follow check-out procedures and that don't need detailed reports of the changes to a file. Apr 93

★★★ **WordPerfect for Macintosh 2.1 (2.1.3), WordPerfect Corp., 801/225-5000, $495.** Play QuickTime movies in your text files or publish and subscribe with this upgrade. It continues to provide the best desktop publishing and graphics capabilities of any word processor, but it lacks glossary- and table-creation features. Jun 92

★★★★ **WriteNow 3.0, WordStar International, 415/382-8000, $119.** The streamlined approach of this low-end word processor will appeal to many Macintosh users, especially the storage-conscious. A nice mix of features includes impressive implementation of style sheets. Sep 92

Hardware

INPUT DEVICES

★★★ **A³ Mouse, Mouse Systems Corp., 510/656-1117, $134.95.** A smooth ride and tight resolution characterize this optical device with three light-touch keys. Stronger software would have made it a more attractive package; the software's incompatibilities and limitations are a problem. Jun 92

★★★ **Acecat for Macintosh, AceCAD, 408/655-1900, $149.** It's the hands-down winner in the digitizing-tablet price competition, but although this product works well, it lacks some of the amenities of higher-end tablets. Aug 92

★★ **Apple Adjustable Keyboard, Apple Computer, 408/996-1010, $219.** Adjustable keyboard is a slight improvement on the flat slab keyboard, but hopefully it won't be the last. Theoretically, it corrects a crook in the wrist known as ulnar deviation, but many sufferers of repetitive stress injuries are still hoping for a keyboard that adjusts on a vertical plane. Jul 93

★★★★ **The Bat, Infogrip, 504/766-8082, $495.** Right- and left-hand keypads slant the little fingers down and the thumbs up, with built-in wrist rests. Our reviewer considered it the best ergonomic device she'd seen; the downside is learning to type all over again. Oct 92

★★★ **DrawingBoard II, Drawing Pad, CalComp, 800/932-1212, $645, $395.** Two likable features of these digitizing tablets are the transparent, hinged cover for securing artwork, and a menu strip with buttons for changing drawing modes and accessing macros. Stylus problems and CalComp's haphazard tech support are drawbacks. Jul 92

★★★ **Mouse-Trak, Itac Systems, 214/494-3073, $179.** Well-positioned, easy-to-rotate trackball with a soft wrist-pad is comfortable to use, but must be disassembled to reconfigure the buttons. Nov 92

★★★ **MouseMan, Logitech, 510/795-8500, $129.** Bear-paw–shape mouse with three programmable buttons is handsome and solidly made. It may be too big for some hands. Jun 92

★★★ **TrackMan, Logitech, 510/795-8500, $99.** There's a right-hand bias to this trackball with three programmable buttons and a click-lock feature. Jun 92

★★★★ **Turbo Mouse 4.0, Kensington Microware, 415/572-2700, $169.95.** Large buttons on either side of this trackball provide just the right measure of tactile feedback; the removable ball glides freely. But the breakthrough feature is the software that lets you customize many of the trackball's functions. Nov 92

★★★ **The UnMouse, MicroTouch Systems, 508/659-9000, $199.** Input device is a cursor-control device, programmable keypad, and small graphics tablet in one, and can be programmed with 60 macros (although only 16 can be selected by sight). It's ergonomically better than a mouse, but not as good as a trackball. May 93

★★★ **Voice Navigator II, Articulate Systems, 617/935-5656, $699.** Stand-alone SCSI device has an impressive, full-featured set of tools for voice control of your Mac, but mastering them takes time and effort. Apr 92

★★★ **Z-Nix Cordless SuperMouse, DynaPoint, 818/854-6440, $99.** Sleek and attractive cordless mouse works reliably and is attractively priced, but suffers from the same line-of-sight limitations as other infrared devices (such as TV remote controls). Dec 92

MISCELLANEOUS HARDWARE

★★★ **ACS300 Computer Speaker System, Altec Lansing Consumer Products, 717/296-4434, $400.** Clamshell-shape high/midrange speakers come with a freestanding subwoofer and power supply. The sound is rich and smooth, but the cabling is nonstandard,

and there is no on/off switch. Nov 92

★★★★ **AppleCD 300, Apple Computer, 408/996-1010, $599.** Double-speed CD-ROM drive spins its discs at twice the speed of earlier drives, providing faster access to large files. It also reads multisession Photo CDs. Jun 93

★★★ **Bose RoomMate speakers, Bose Corp., 508/879-7330, $329.** Shielded stereo speakers with a rich, bassy sound can double as regular stereo speakers. Unfortunately, they're heavy, expensive, and the highs are muddy. Jun 92

★★★ **MacSpeaker MS-1, Monster Cable, 415/871-6000, $229.95.** Crystal-clear highs and a meaty midrange are the best features of these shielded stereo speakers. They're beautifully designed for close-up listening, but the bass sounds wimpy. Jun 92

★★★★ **Media Control Station 1.0 (1.01), JLCooper Electronics, 310/306-4131, $269.95.** This versatile tool connects to the Mac through an ADB port and offers an easy and intuitive way to cue and edit QuickTime movies, MIDI files, multimedia playlists, and other dynamic data. Feb 93

★★★★ **The Miracle Piano Teaching System 1.0, Software Toolworks, 415/883-3000, $419.95.** Painstakingly crafted music and piano instructor comes with keyboard, software, and 120 songs, including classical, movie-theme, and rock. The program offers encouragement and advice, and ends every lesson with a synthesized orchestra accompaniment. Oct 92

★★★★ **The Mouse Yoke, Colorado Spectrum, 303/225-6929, $34.95.** Gadget turns an ordinary mechanical mouse into an aircraft-style steering wheel, or yoke, for use with flight simulators. Simple, elegantly executed concept uses quality materials; device is not appropriate for driving simulations or shooting games. Dec 92

★★★ **Organizer Link II (Model OZ-893), Sharp Corp., 800/321-8877, $129.99.** If you own a 5000-, 7000-, or 8000- series Sharp Wizard, this program and cable let you connect it to a Mac serial port to exchange data. It's functional, but has some minor weaknesses. Jan 93

★★★ **PhonePro 1.0.3 (1.1.5), Cypress Research Corp., 408/752-2700, $950.** Application makes it relatively easy to develop a multiple-choice voice-mail system using your Mac, especially for those with programming backgrounds. The product includes a 9600-bps modem and a headset/microphone. Feb 93

★★★★ **PowerKey 2.0 (2.01), Sophisticated Circuits, 206/485-7979, $119.** Ingenious, well-designed automated power strip has four surge-protected outlets controlled by the keyboard's on/off switch. The software can turn on a Mac, unattended, run a QuicKeys macro (QuicKeys Lite included), and shut down again. Dec 92

★★★ **Yamaha TG100, Yamaha Corp. of America, 714/522-9011, $449.** Compact, keyboardless, multitimbral MIDI synthesizer with built-in MIDI interface adheres to the life-simplifying General MIDI standard patch arrangement. Although it won't convince you that you're hearing a live orchestra, the sound is about as realistic as low-cost MIDI gets. Apr 93

MODEMS/NETWORK HARDWARE

★★★★ **Comstation 2, PSI Integration, 408/559-8544, $295.** Unusually well designed software accompanies this fax/data modem. The simple, straightforward interface and handy QuicFax DA are positives; uninformative error messages are minor negatives. Jun 92

★★★ **Comstation 4, PSI Integration, 408/559-8544, $495.** An otherwise solid fax/data modem for network use is hurt by an awkward process for distributing faxes, plus the need for a separate file server and fax server. Jun 92

★★ **EtherPrint 1.0 (2.0), Dayna Communications, 801/531-0600, $499.** It's possible to connect a single LocalTalk printer to an Ethernet network using this device, but it's an expensive option. Dec 92

★★★ **EtherPrint Plus, Dayna Communications, 801/531-0600, $599.** Support four LocalTalk products on an Ethernet network using this device that can also serve as an inexpensive AppleTalk router. Dec 92

★★★★ **EtherWrite, Compatible Systems Corp., 303/444-9532, $695.** Elegant and cost-effective device with excellent network-management software allows up to six LocalTalk products to connect to an Ethernet network. Dec 92

★★★★ **PathFinder, Dayna Communications, 801/531-0600, $899.** For simple networks, this LocalTalk-to-Ethernet router is a great value, as well as a great time-saver for beginning network managers. It uses AppleTalk only. Jan 93

★★★ **PowerModem, PSI Integration, 408/559-8544, $299.** Superior fax software distinguishes this fax/data modem for PowerBooks, but it's not the best choice for those who do a lot of online work that requires a high-speed data modem. Jul 92

★★★★ **PowerPort/Gold, Global Village Communications, 415/329-0700, $499.** If you need 14,400-bps throughput, this data/fax modem is a champ. Its improved software and packaging raise the standards for PowerBook modems. Dec 92

★★★★ **Sportster 14,400 Fax/Data Modem, U.S. Robotics, 708/982-5001, $329.** Several nice features, including an easily accessible power button and a front-mounted volume-control dial, make this 100 percent Mac-ready, 14,400-bps fax/data modem better than average. Feb 93

★★★★ **SupraFaxModem V.32bis, Supra Corp., 503/967-2400, $399.95.** Send and receive faxes and data at speeds up to 14,400 bps with this attractively priced fax/data modem. The software works well; tech support is adequate. Aug 92

★★ **Ultima Home Office, Prometheus Products, 503/692-9600, $499.** When it can reliably transmit data at high speeds and the bugs are fixed, this fax modem with voice mail will be worth a second look. Oct 92

★★ **Viva 14.4/Fax, Computer Peripherals, 805/499-5751, $299.** In data mode, this 14,400-bps fax/data modem performed well, but the software bundled with it is barely adequate. Jan 93

★★ **WorldPort 9600 MNP5, U.S. Robotics, 708/982-5001, $499.** Only slighter larger than a deck of cards, this 9600-bps modem is geared toward PC users, with a user guide that never mentions Macs and software that is only for PC compatibles. Jan 93

PRINTERS

★★ **C. Itoh ProWriter Printer, C-Tech Electronics, 714/833-1165, $2395.** Not only is this laser printer more expensive than most personal page printers, it also offers less-impressive features and so-so output. Nov 92

★★★★ **DEClaser 1152, Digital Equipment Corp., 508/493-5111, $1299.** Four-pages-per-minute, 300-dpi, PostScript Level 2 printer offers simultaneous support for Macs and PCs, plus excellent image quality, for a ground-breaking price. The internal font set is small, and the included 2MB of memory is not enough to print complex images. May 93

★★★★ **HP LaserJet 4M, Hewlett-Packard, 800/752-0900, $2399.** An Intel i8960 RISC processor makes printing complex images faster than ever with this 600-dpi printer, while the Canon LBP-EX print engine and microfine toner guarantee smooth curves and crisp characters. An autoswitch feature makes it a flexible option for mixed-platform offices. Feb 93

★★★ **HP PaintJet XL300, Hewlett-Packard, 800/752-0900, $2795.** The output of this color inkjet printer won't satisfy demanding graphic arts professionals, but it's great for business users interested in punching up their presentations. Oct 92

★★★★ **IBM LaserPrinter 10A, IBM Corp., 800/358-5835, $2499.** Beautifully defined text, razor-sharp line art, clear gray tones—the output from this large, awkwardly designed, 600-dpi PostScript printer is dazzling, and all for under $3000. Aug 92

★★★ **LaserWriter Pro 600 and 630, Apple Computer, 408/996-1010, 600 $2099, 630 $2529.** From their paper handling to their print quality, these laser printers are Apple's best printers, as well as the best printers available in their price range. Unfortunately, they don't support emulation-sensing, and thus may be less desirable for mixed-platform offices than other possibilities. Jun 93

★★★★ **LZR 1560, Dataproducts Corp., 818/887-8000, $3395.** Tabloid-size 400-dpi laser printer blazed through our standard printer speed tests and produced output noticeably better than that of 300-dpi printers. It's a good choice for a mixed network. Sep 92

★★★★ **LZR 960, Dataproducts Corp., 818/887-8000, $2195.** This peach of a personal PostScript printer is compact, fast, and produces excellent output. Our reviewer experienced low-memory error messages, but most memory problems should be solved with the current shipping configuration of 3MB of RAM. Jul 92

★★ **PrintPartner 10W, Fujitsu Computer Products, 408/432-6333, $2450.** While this multiplatform printer is fast, relatively inexpensive, and prints clearly, many Macintosh users will find it more frustration than it's worth; it can't print TrueType fonts that are not stored internally, including some that are shipped as part of System 7. Jul 93

★★★ **RasterOps CorrectPrint 300, RasterOps Corp., 408/562-4200, $8999.** The cost of high-quality, photo-realistic color printing takes a nosedive with this 300-dpi, dye-sublimation printer. The relatively small (8.1 by 8.6 inches on letter-size media) print area is the only significant flaw. Oct 92

★★★★ **RealTech Laser 400, Hardware That Fits, 409/760-2400, $3195.** Exactly the same tabloid-size, 400-dpi printer as the Dataproducts LZR 1560, but for slightly less money. And it produces output that is perceptibly better than that of 300-dpi printers. Sep 92

★★★★ **StyleWriter II, Apple Computer, 408/**

continues

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MACWORLD Star Ratings

996-1010, $359. Apple's ink-jet printer retains the best features of its predecessor, but costs less. New features, such as gray-scale printing and the ability to share the printer over a network, make it even more versatile. Jun 93

★★★ **TI microLaser Turbo, Texas Instruments, 800/527-3500, $1649.** An enhanced version of Texas Instrument's microLaser Plus, this PostScript Level 2 printer is an admirable performer and a dependable machine, but it leaves you wondering whether the extra $500 is worth it. Jul 92

★★★ **WideWriter, GCC Technologies, 617/275-5800, $1699.** Large-format output comes in a reasonably priced package with this ink-jet printer that can automatically feed sheets as large as 14 by 91 inches or manually feed sheets 17 inches wide with an unlimited length. Feb 93

★★★ **WriteMove II, GCC Technologies, 617/275-5800, $599.** Portable printer for the PowerBook measures 11½ by 2 by 3½ inches and weighs 2½ pounds. It's no speed demon, but it's fine for short jobs. May 93

SCANNERS

★★★★ **Apple Color OneScanner, Apple Computer, 408/996-1010, $1349.** Tests of this impressive color scanner demonstrate unpolluted colors and sharp image details, perhaps due to color filters and lenses that Apple claims were specially designed and tuned for the scanner. Jul 93

★★★★ **HP ScanJet IIP, Hewlett-Packard, 800/752-0900, $879.** An elegant piece of technology, this desktop gray-scale scanner produces excellent results for a street price of around $750. Muddled online help and a flimsy hinge are minor problems. Aug 92

★★★★ **LightningScan Pro 256, Thunderware, 510/254-6581, $649.** Well-executed hand-held gray-scale scanner creates 8-bit scans at up to 400 dpi; images scanned in two passes can be joined flawlessly. The only drawback is slow scrolling in software. Jun 92

★★★★ **Mirror 600 Color Scanner, Mirror Technologies, 612/633-4450, $1199.** Three-pass scanner with 600-dpi vertical and 300-dpi horizontal resolution is fast, precise, and an excellent value. The only liability is its somewhat quirky software. Apr 92

★★★★ **Nikon LS-3510AF Film Scanner, Nikon, 516/547-4355, 8-bit $9535, 24-bit $11,316.** The bread-box–style design of this 35mm film scanner may be reminiscent of past models, but many changes make it faster and more convenient. Still, advanced users won't be satisfied with the tools for overriding automatic exposure and tone adjustments. Sep 92

★★ **PageBrush Professional 1.0 (1.02), Mitsubishi International, 415/544-2781, $795.** A brilliant idea with unfortunate rough spots. Gray-scale, hand-held scanner/mouse scans full-page or larger images and produces 300-dpi gray-scale files, but the process and software are agonizingly slow; the buttons are hypersensitive; and the product is expensive. Jun 92

★★★ **RasterOps Expresso Personal Slide Scanner, RasterOps Corp., 408/562-4200, $849.** Essentially a video camera mounted above an illuminated stage, this slide scanner outputs NTSC video. It's fast, convenient, and economical, but falls short for digital images; its best file looks worse than output from a 24-bit flatbed or slide scanner. Apr 92

SYSTEMS/STORAGE

★★★★ **FastCache Quadra, Daystar Digital, 404/967-2077, Quadra 950/900/700 version $449, Quadra 900/700 version $299.** PDS board provides 128K of secondary cache for a Quadra with 15ns static RAM (25ns on 900/700). The average real-world speed improvement is 15 percent, but some operations benefit more from the cache card than others. May 93

★★★★ **Floptika 20/M, Procom Technology, 714/852-1000, $545.** It is easy to recommend this floptical drive due to its speed, relatively low cost, bundled software, and lack of problems. Although it allows invalid SCSI ID addresses, it's a fine product. Sep 92

★★★ **Infinity Floptical 21MB, Peripheral Land, 510/657-2211, $582.** The good points of this floptical drive include extensive documentation, switchable termination, and an autoeject function, but the bad points are the odd size, the incompatibility of the bundled software with System 7, and inappropriate formatting of 800K disks. Sep 92

★★★ **Infinity Optical 3.5, Peripheral Land, 510/657-2211, $1999.** If you need the extra measure of permanence that magneto-optical storage provides—or you want a compact alternative to bulky cartridges—this drive, based on a Sony mechanism and using 3½-inch disks that store 120MB of data, deserves a look. Jun 93

★★★ **Macintosh Centris 610, Apple Computer, 408/996-1010, 4/80 $1859.** Slim-design Mac uses a 20MHz 68LC040 processor at a price-to-performance ratio that comes close to competing with low-price Windows PCs; however its expandability is severely limited. Jun 93

★★★★ **Macintosh Centris 650, Apple Computer, 408/996-1010, 4/80 68LC040 $2699.** Moderately priced but fast 040 system offers three expansion slots and one drive bay, and (except for the base model) has built-in Ethernet, video circuitry, and a math coprocessor. This desktop Mac is as powerful as a Quadra 700 and two times as fast as a IIci. Jun 93

★★★ **Macintosh Duo Dock, Apple Computer, 408/996-1010, $1079.** Immensely clever desktop-Mac–size housing for the Duo laptops provides back-panel connectors, a SuperDrive, electrical and physical support for external monitors, and two expansion slots. Although the Duo Dock is easy to like, some details, such as the difficulty of installing NuBus boards, belie Apple's usual attention to detail. Mar 93

★★★★ **Macintosh LC III, Apple Computer, 408/996-1010, $1349 4/80.** Base system comes equipped with a 25MHz 68030 processor, 4MB of RAM soldered to the logic board, an 80MB internal drive, and 512K of VRAM. This is a machine that fits the bill and the pocketbook for most home and small-business owners. Jul 93

★★★ **Macintosh PowerBook 145, Apple Computer, 408/996-1010, $2149 to $2499.** Adequate but essentially outdated notebook computer is an upgraded version of the discontinued PowerBook 140 with a faster 25MHz 68030 CPU, but RAM expansion is limited, and it doesn't have a built-in video port. Feb 93

★★★★ **Macintosh PowerBook 160, Apple Computer, 408/996-1010, $2429 to $3149.** A built-in video port and gray-scale capability are the new

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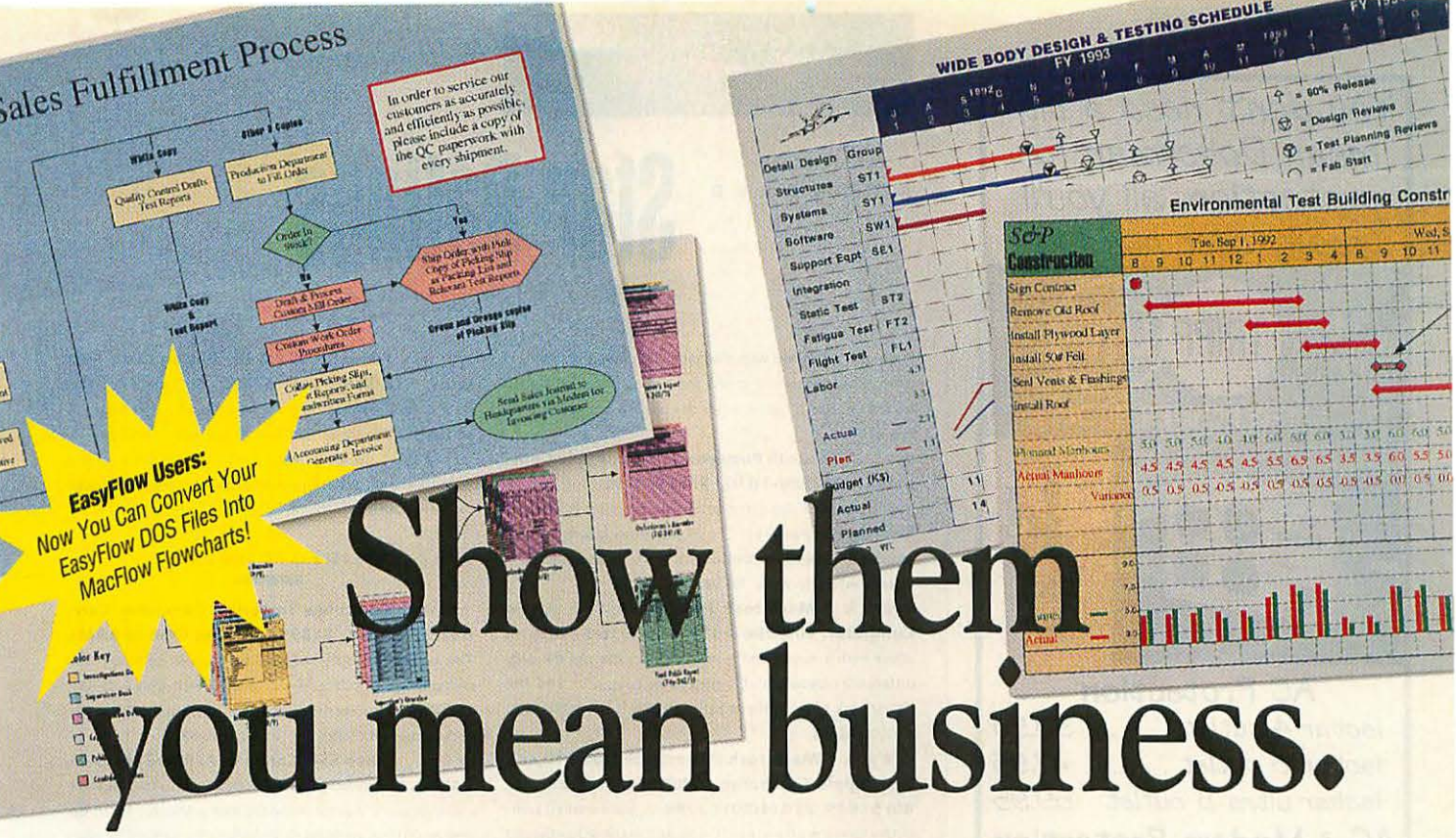

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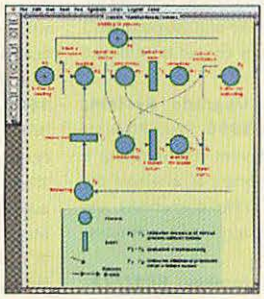

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MacUser Magazine July '91

MacSchedule 3.0
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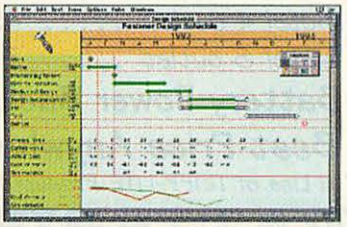

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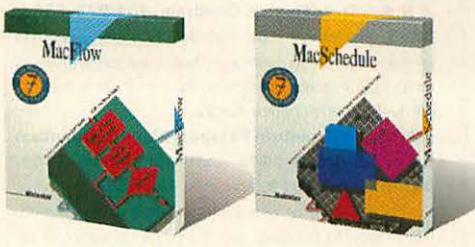

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MACWORLD Star Ratings

features Apple offers with this notebook computer. While it offers good processing speed and power, the passive matrix display doesn't cut it for all-day use as a primary screen. Feb 93

★★ **Macintosh PowerBook 165c, Apple Computer, 408/996-1010, $3399 4/80.** The passive matrix screen of this color notebook computer is dull and has noticeable afterimages, but if your expectations are reasonable, the speedy processor provides a pleasant environment in which to work. Jul 93

★★★★ **Macintosh PowerBook 180, Apple Computer, 408/996-1010, $4109 to $4469.** An active matrix screen and a math coprocessor are the only differences between this notebook computer and the PowerBook 160, but the beautiful display is worth the extra $1000. Feb 93

★★★★ **Macintosh PowerBook Duo 210 and 230, Apple Computer, 408/996-1010, 210 (4/80) $1839, 230 (4/80) $2299.** Apple's smallest computers have the pleasing heft, size, and shape of hardbound books but pack the horsepower of 030 chips. Although the screen, keyboard, and trackball (more of a "trackmarble") feel small, these computers virtually cry out to be picked up, handled, and used. Mar 93

★★★ **MicroMac Plus Upgrade System, MicroMac, 714/362-1000, $998.** This 68030 accelerator for the Mac Plus requires disassembling a Plus and using the Plus system board to assemble the MicroMac system. It speeds up the Plus dramatically, and supports an included external full-page monochrome monitor. Jun 93

★★★★ **MultiDisk 150, Iomega, 801/778-1000, $1225.** Durable cartridges are one of the strongest reasons to choose this Bernoulli removable drive. Although the drive is slightly more expensive than a SyQuest drive, it's fast and reliable, and the disks are competitively priced. Jun 93

★★ **Performance/040 (33MHz), Impulse Technology, 404/889-8294, $2399.** For disk-intensive tasks, this 68040 33MHz accelerator board tested slower than the native CPU and, in general, was slower than comparable accelerator boards. It is compatible with all Mac II's. Oct 92

★★★ **PLI MiniArray 850MB, PLI MiniArray 2GB, Peripheral Land, 510/657-2211, $6999.** These RAID storage systems contain multiple drives that work as a single unit; they're an excellent option for image processing or tasks that involve importing and exporting large files, but the price per megabyte is high. Jan 93

★★★ **QuadFlextra, Quadram, 404/923-6666, $495.** Remarkable super-high-density floppy drive uses an ingenious disk-formatting method to put just over 20MB on a single 3½-inch floppy disk, but it may not be as cost-efficient as other options. Apr 92

★★★★ **Quantum Passport XL 240, Quantum Corp., 800/624-5545, external chassis $469, 240MB drive $979.** An excellent piece of engineering, this fast, trouble-free, removable hard drive solves the problem of how to transport data from one computer to another. The price is only somewhat discouraging. Oct 92

★★★★ **Radius Rocket 33, Radius, 408/434-1010, $2499.** The accelerator board of choice for our reviewer, this 68040, 33MHz board is fast, reasonably priced, and compatible with a Mac II (with Rev. B ROM), IIx, IIcx, or IIci. Oct 92

★★★ **TokaMac II FX 33, Fusion Data Systems, 512/338-5326, $2595.** CPU and FPU tasks on a Mac IIfx are faster than on a Quadra 950 with this 68040 33MHz accelerator board, but video- and disk-intensive tasks are still slower. It may be worth the cost if your IIfx already has a fast video board and more than enough memory. Oct 92

VIDEO/DISPLAY

★★★ **BookView Imperial, Computer Care, 612/371-0061, $1399 (includes 6MB of RAM).** This notebook-display adapter supports all common sizes of monitors, including 16-inch and 19-inch, plus both Mac and VGA. It is expensive, however, and uses 2MB of system memory for video processing. Feb 93

★★★ **Canon ESP, Canon USA, 516/328-5970, $4500.** No-nonsense package enables you to shoot still-video pictures, digitize the video into a Mac for touch-up, and record the modified shots back to the camera for playback through any television set. It's good for presenters who need to incorporate photographs, but it is quite expensive. Apr 93

★★★ **L-TV, Lapis Technologies, 510/748-1600, $349.** Interface board allows a Mac LC, LC II, or Performa to use a standard television monitor as a display device. Unfortunately, a standard television is a poor substitute for a color monitor, so while the L-TV does its job adequately, the setup is unsuitable for many applications. May 93

★★★ **Lightning Effects II, Spectral Innovations, 408/955-0366, $1295.** Digital-signal-processor chips dramatically speed up some Photoshop operations with this expensive Photoshop-acceleration board. It had problems acquiring some JPEG files. May 93

★★★★ **Macintosh 16" Color Display, Apple Computer, 408/996-1010, $1459.** The display quality of Apple's 16-inch monitor is tough to beat. It has realistic color, minimal curvature, and a uniform display. Jun 92

★★★ **Power Portrait, Sigma Designs, 510/770-0100, $899 or $949.** Hook your Classic or PowerBook to this 15-inch portrait-style monochrome display. Built-in QuickDraw acceleration speeds up the slow SCSI connection on the one hand and results in a few software incompatibilities on the other. Feb 93

★★★★ **PowerVision, Mirror Technologies, 612/633-4450, with no RAM $499, with 2MB of RAM $699, with 4MB of RAM $999.** Separate VRAM means you don't lose system memory with this nicely priced notebook display adapter. It only supports 12-inch and 14-inch monitors, and 15-inch portrait gray-scale and black-and-white monitors. Feb 93

★★★★ **ThunderStorm, SuperMac Technology, 408/245-2202, $999.** Photoshop-acceleration board uses digital-signal-processor chips to speed up some Photoshop operations. It's fast, with good JPEG compatibility and a great manual. May 93

★★★★ **VideoSpigot, SuperMac Technology, 408/245-2202, $449 to $1299.** Grab video from a camcorder, video deck, TV, or monitor with this easy-to-install board and save it as a 24-bit QuickTime movie. Comes with ScreenPlay, an application that lets you choose from among several compression options, frame rates, and window sizes. May 92 m

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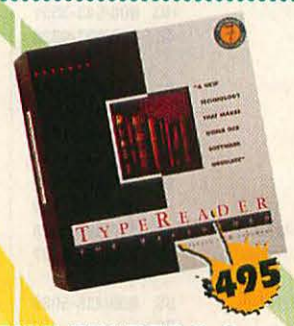

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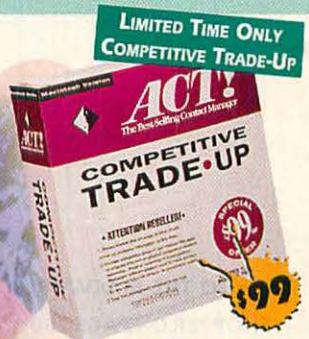

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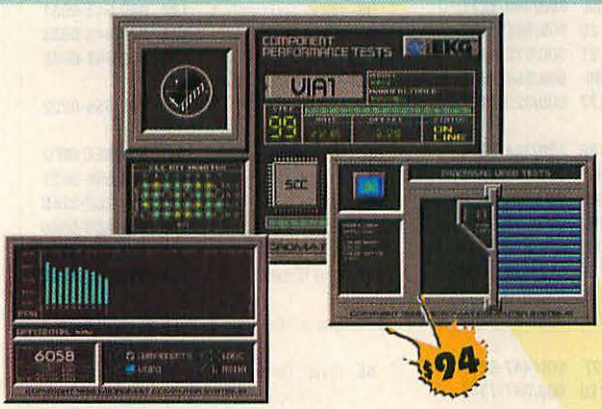

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A. Including yourself, approximately how many people are employed at your entire work-site (i.e., employees in your office, building, or cluster of buildings)? (Check one.)

01 ❑ 1000+
02 ❑ 999 - 100
03 ❑ 99 - 25
04 ❑ Under 25

B. Which of the following computers are installed at this entire work-site? (Check all that apply.)

05 ❑ Apple Workgroup Servers/ Mac Quadra-series
06 ❑ Mac Centris-series/II-series/LC III/ Performa 600/450/SE 30
07 ❑ Mac LC/LC II/Performa 430/405/ 400/200/Classic-series/SE/Plus/ 512K/128K/Portable
08 ❑ Mac PowerBook-series/Duo-series

C. What is the total number of Macs installed at this entire work-site? (Check one.)

D. For how many Macintosh computers within this entire work-site do you have purchase involvement for products and/ or services? (Check one.)

	C	D
500+	❑ 09	❑ 15
499 - 100	❑ 10	❑ 16
99 - 50	❑ 11	❑ 17
49 - 10	❑ 12	❑ 18
9 - 1	❑ 13	❑ 19
None	❑ 14	❑ 20

E. In which ways are you ever involved in purchase decisions for Macintosh products at this entire work-site? (Check all that apply.)

21 ❑ Initiate/Determine need for product/capabilities/features
22 ❑ Evaluate, recommend, or approve brands/models
23 ❑ Evaluate, recommend, or approve purchase source
24 ❑ Authorize purchases

F. Over the next 12 months, how much will this entire work-site spend on Macintosh products and/or services? (Check one.)

25 ❑ $1 million or more
26 ❑ $999,999 – $500,000
27 ❑ $499,999 – $100,000
28 ❑ $99,999 – $50,000
29 ❑ $49,999 – $10,000
30 ❑ Under $10,000

G. Considering the entire work-site, which of the following Macintosh hardware and software products are currently installed? (Check all that apply.)

31 ❑ Business software (Word processing, spreadsheet, database, etc.)
32 ❑ Graphics/publishing software
33 ❑ Monitors/displays
34 ❑ Printers/scanners
35 ❑ Networking/communications hardware and/or software
36 ❑ Multimedia/AV hardware and/or software
37 ❑ Mobile computing products (PowerBooks, peripherals, software, etc.)

H. What is your primary job function? (Check one.)

38 ❑ Computer Reseller/VAR/VAD
39 ❑ MIS/DP/IS/Network Management
40 ❑ Engineering
41 ❑ R&D/Scientific
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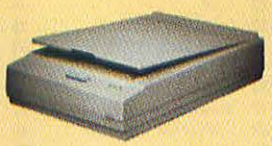

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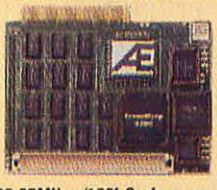

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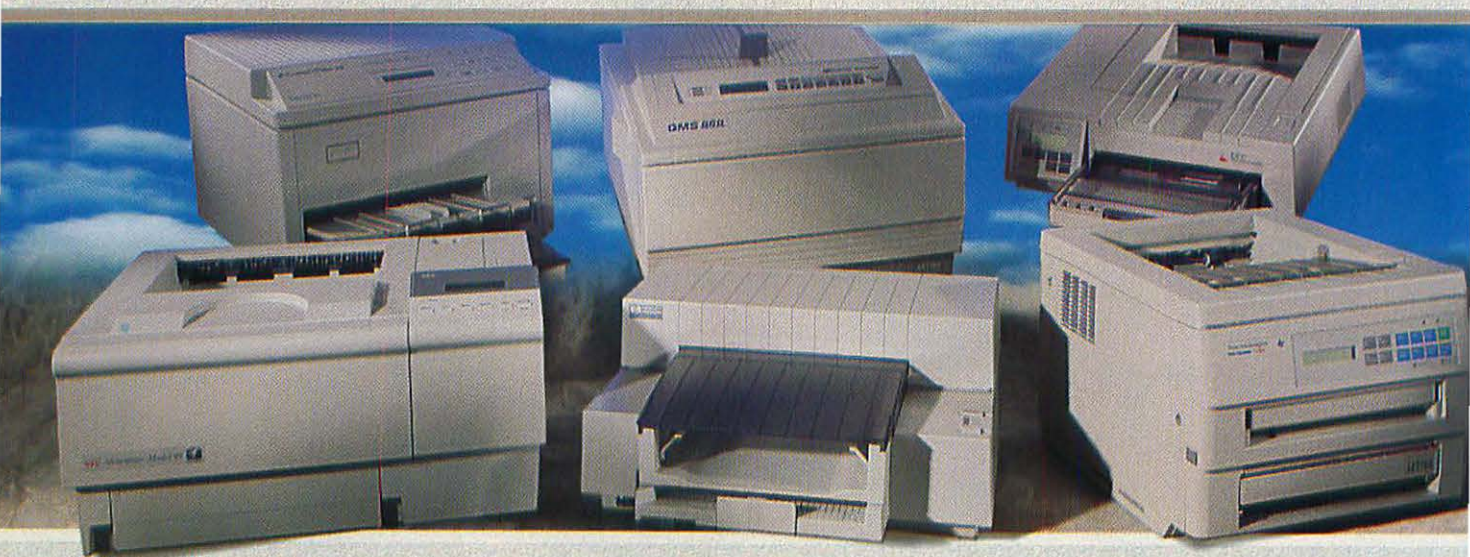

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*After Manufacturer's Rebate

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HP 550C $715
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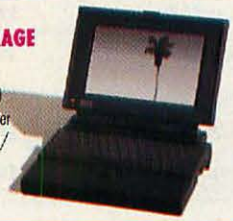

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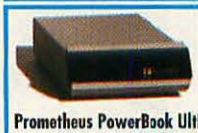

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(#6550, Leader Technologies/Targus)

Minimum requirements: Mac Plus, 1MB RAM, System 6.0.4, 2MB RAM under System 7.

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(#4324, Aldus Consumer Products)

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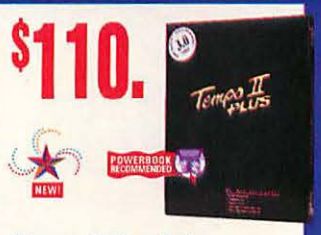
Minimum requirements: SE, 2MB RAM, System 6.0.4, hard disk.

$110.



Tempo II Plus 3.0

Automate your Mac with "intelligent" macros. Create hundreds of time-saving shortcuts, and simplify complex tasks. Tempo's "interactive" macros use conditional tests to determine how to format a document, when to back up your database, or which filters to apply in a "batch-process" task. Free phone dialer included! (#6534, Affinity Microsystems Ltd.)

Minimum requirements: Mac Plus, 1MB, System 6.0.2.

$528.

Painter 2.0 & ArtZ Bundle

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Minimum requirements: SE 30, 2.5MB RAM, System 6.0.5.

$49.

PANTONE Process Color System Guide 1000

$58.

PANTONE Process Color Image Guide

The PANTONE Process Color Imaging Guide 1000 is the perfect companion to all PANTONE-licensed software programs. It provides a visual comparison of 942 solid PANTONE Colors and process simulations as they would appear on the final printed piece. (#5160) When you need a much broader selection of process colors, turn to the PANTONE Process Color System Guide. This fan-out process color selector provides users with a visual color standard and screen percentage values for over 3,000 new CMYK combination, which are easily created, specified, and reproduced with your favorite graphics program. (#5159, PANTONE)

$224.

DeBabelizer

This graphics processing toolbox will save you lots of time, effort, and money. It translates from and to over 50 bit-mapped graphic file and animation formats for Mac, DOS, Windows, Silicon Graphics, Sun Microsystems, Amiga, and others. You can even edit images without the creating software. Batch processing and internal scripting functions save time by automating repetitive manipulation and editing tasks. Create QuickTime blue-screen effects with background removal features. DeBabelizer will also report and display differences between original and revised images. Jack Eastman, VP Engineering of Berkeley Systems (makers of After Dark) says, "DeBabelizer has the best cross platform graphics translation for serious graphics production. We couldn't product our graphics without it."
(#6193, Equilibrium)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.7.

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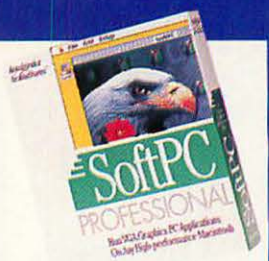
Minimum requirements: Mac Plus, 2MB, System 6.0.5.

$188.



SoftPC Professional

Do the PC one better by bringing PC applications to your Mac! There's no need to add hardware. With SoftPC, software does it all. SoftPC Professional 3.0 emulates VGA graphics giving you 256 colors and increased monitor resolutions to show crisp, realistic, and vibrant graphics. It emulates an 80286 processor and an Intel 80287 math coprocessor. Run protected-mode MS-DOS applications which have been written to utilize extended memory. MS-DOS 5.0 is pre-installed. And Microsoft CD-ROM extensions are also included, which means that you can run PC CD-ROMs with your Mac CD-ROM drive. Plus, you can easily copy and paste text and graphics between PC and Mac applications. (#5925, Insignia Solutions)

Minimum requirements: SE/30, 8MB RAM, System 6.0, 6MB hard drive space.

$88.*

Action!

$499.

NEW!

MacTransportable 90 Pro

Get Action! for $88 when you buy the MacTransportable 90 Pro. Action! makes it easy to create dazzling presentations that combine motion, sound, text, graphics, animations, and QuickTime movies. The built-in ClipMedia library of graphics, sounds, and animations gives your presentation a professional look and sound in an instant. (#6532, MacroMedia) The Bernoulli MacTransportable 90 PRO is designed especially for the Mac, at a low price. This external, removable-disk drive comes complete with a 90MB cartridge and installs easily without an interface kit. You'll enjoy unlimited storage expandability, lock-away security, and transportability. As with all Bernoullis, the patented design resists head crash. And the sturdy disks can survive a drop of eight feet! (#5012, IOMEGA)

Minimum requirements: Mac Plus, System 6.0, 2MB RAM and System 6.0.2 for Action!

$789. MacTransportable MultiDisk 150 (#5609) *** Must purchase MacTransportable 90 Pro.**

$98.

POWERBOOK RECOMMENDED

Times Two

Get a free sports bottle with Times Two! If your hard disk is bursting at the seams, you need TimesTwo! An easy, one-time installation expands your disk capacity as much as 100 percent in minutes. Unlike file compression products, TimesTwo works by transparently compressing disk blocks, not files. So when you move a file from your TimesTwo hard disk to another device or across a network, it arrives in its original form. TimesTwo is compatible with all Mac software, including file recovery programs, and works with all SCSI disks. See for yourself why TimesTwo was a 1992 *MacUser* Editor's Choice finalist! (#5233, #5600, Golden Triangle)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.4.

Get a SyQuest Cartridge for only $60 with the purchase of TimesTwo. (#2269, limit 5)

$30.*

Star Trek The Screen Saver

Beam out burn-in with Star Trek The Screen Saver, the Eddy award winner with over 15 sights and sounds of Tribbles, Captain Kirk, Spock, Klingon battleships, and more. It's a stand-alone product that's also compatible with After Dark's 30 displays. (#5341, Berkeley Systems)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.4.

$39. After Dark and More After Dark Bundle (#3523)

*** After $5 manufacturers rebate.**

Offer expires 7/31/93

$145.

Retrospect 2.0 Retrospect Remote 2.0

Retrospect provides powerful backup and storage management. If your hard disk crashes, Retrospect can restore it to its pre-disaster state and get you back up to speed in minutes. (#6048)

Retrospect Remote is centralized backup and archive software for Macintosh networks. Complete automation allows for daily, unattended backup of ten Macs to a single storage device. (#6050, Dantz Development)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.5, a hard disk, 4MB RAM under System 7.

$748.

Infinity 105

The Infinity 105 is the smallest and fastest removable SyQuest drive available. It provides sustained data transfer rates of up to 1.75MB/sec. and access time of 14 ms. It allows you unlimited storage capabilities by simply adding additional 105MB 3.5" cartridges. The Infinity 105 is an ideal storage device for animators, on-line editors, and users of interactive multimedia who need to take their shows on the road. It's about the size of a paperback novel so it's a perfect portable storage solution. And it can also be daisy-chained to other devices for desktop use with an external power supply. (#6255, PLI)

$98. SyQuest 105MB 3.5" Cartridge (#6256)

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This new fax upgrade service is exclusively available at Mac's Place. And it's the easiest way to upgrade. All you do is fill out this upgrade order form, purchase by credit card, and fax the form and proof of ownership required to our toll-free fax upgrade line. That's it. Your upgrade order will be processed within 24 hours and on its way for overnight delivery. No hassles, no toll calls, no time and postage wasted on mailing your proof of ownership. Mac's Place is *the* Place to call first for great prices and service. And the only place to fax for easy toll-free upgrading.

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What Macintosh model do you have? _____

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JUST FILL IN THE FORM, CHECK WHICH UPGRADE(S) YOU WANT, ADD UP THE TOTAL WITH SHIPPING, AND FIRE OFF A FAX WITH THE SERIAL NUMBER AND FIRST PAGE OF YOUR OWNERS MANUAL AS PROOF OF OWNERSHIP.

OWNERS OF PREVIOUS VERSIONS QUALIFY FOR THESE UPGRADES.

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☐ 4991	Adobe Premiere 2.0-Upgrade	$149.
☐ 6045	Adobe Super ATM-Upgrade	$49.
☐ 6538	Altsys Fontographer 4.0 - Upgrade	$99.
☐ 6456	Apple Computer System 7.1 Personal Update	$29.
☐ 6276	Claris Works 2.0-Upgrade	$95.
☐ 5556	Filemaker Pro 2.0-Upgrade	$88.
☐ 4824	MacDraw Pro 1.5-Upgrade	$98.
☐ 6281	MacProject Pro-Upgrade	$98.
☐ 6282	MacWrite Pro-Upgrade	$68.
☐ 4357	Microsoft Excel 4.0-Upgrade	$124.
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☐ 5571	Microsoft Word 5.1-Upgrade	$124.
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☐ 6002	Portfolio Systems Dynodex 3.0-Upgrade	$28.
☐ 6521	Symantec C++ Upgrade	$129.
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☐ 4353	Claris Resolve-Comp Upgrade	$95.
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☐ 5592	Contact Software ACT-Comp Upgrade	$89.
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☐ 5347	Frame Technology Framemaker-Comp Upgrade	$298.
☐ 6207	Helix Technologies Helix Express-Comp Upgrade	$94.
☐ 4349	Lotus Development Lotus 1-2-3-Comp Upgrade	$98.
☐ 6242	Microsoft Foxbase+/Mac-Comp Upgrade	$147.
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☐ 6153	WordPerfect 2.1-Comp Upgrade	$108.

WA (8.2%) and OH (6%) residents ONLY add sales tax for Sub Total: $_____

Add $3 shipping for Grand Total: $_____

System 7.1 Update Kit

The latest System 7 version, System 7.1, installs easily with one click of the mouse. A new font folder for central installation and storage and World Script support for complex character sets such as Japanese are new features. System 7.1 also includes all the fixes now included in the System 7 Tune-Up extension. This update is for System 7 users only.

(#6456, Apple Computer)

Minimum requirements: SE/30, 2MB of RAM, a hard drive.

$29.

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$128.

Help! & Peace of Mind Bundle

Catch incompatibilities and problems affecting your Mac with this bundle available only from Mac's Place. Help! is great technical support. It not only analyzes systems and highlights potential problems, but it also suggests possible solutions to those problems. Help! collects information about your system configuration, compares it with a set of rules in its built-in knowledge base, displays the results on your screen, and lets you print out the report. And you can perform over 150 comprehensive hardware diagnostics with Peace of Mind. It provides a complete diagnostic test suite and a real hardware workout. Peace of Mind is ideal for testing your RAM, monitors, SCSI bus & disks, video processors, sound, keyboard, speaker and microphones, modem, mouse, floppy drive, printer, clock, ROM, and graphics cards. (#6557/6558, Teknosys/Polybus Systems Corporation)

Minimum requirements: Mac Plus, 2MB RAM, System 6.0.5, a hard drive.

$48.

MacFLY

Get fast-reaction control and the ultimate in realism for flight simulators and your favorite Macintosh games with the MacFLY Joystick. Customize the settings to your tastes with the included software. Two independent fire buttons with two modes provide double the functions. Your mouse stays active when you use the MacFLY; just move either device to automatically switch control. (#6458, IZU Products)

Minimum requirements: Mac SE, 1MB RAM, System 6.0.4.

$338.

Symantec C++

Symantec C++ for Macintosh combines the speed of a fast native C++ compiler with the speed and functionality of the THINK development environment. C++ provides an object-oriented approach for faster and easier-to-code development. The THINK Class Library gives you an application framework with all the C++ building blocks you need to write Mac applications. (#6488, Symantec)

Minimum requirements: Mac Plus, 1MB RAM, System 6.0.5, a hard drive.

$328.

cc:Mail Platform Pack

$228.

cc:Mail 10-User Pack

cc:Mail Platform Pack is a fun e-mail system that lets you send messages effortlessly across Windows, DOS, OS/2, Unix, or Macintosh without the need for gateways. Click on mail icons to check your Inbox, prepare messages, store messages, or send memos. Plus, send and receive text, files, faxes, QuickTime videos, and voice annotations – up to 20 mixed media items within a single message. A unique scalable architecture accommodates growth, from 5 people to 500,000. Purchase one cc:Mail Platform Pack per server. cc:Mail uses whichever file server you have – AppleShare, NetWare, LAN Manager, DEC Pathworks, and more. Also, purchase a sufficient number of cc:Mail User Packs to cover your total number of users. (#5921/6160, Lotus)

Minimum requirements: Mac Plus, 1MB RAM, System 6.0.4.

$224. cc:Mail Remote (#6037)

$348.

Yamaha HELLO! MUSIC!

The HELLO! MUSIC! system includes the Yamaha CBX-T3 Tone Generator and easy-to-use "MIDI Player" software. It's fully "General MIDI" compatible, so the world of pre-programmed MIDI music is at your fingertips. If you're a musician, the CBX-T3 can act as your computer's MIDI interface. And you get Passport's Trax, **FREE**. Enter music into Trax by playing your MIDI instrument live or one note at a time, or you can even enter individual notes on screen with your mouse. You also get 192 16-bit samples of CD-quality sound. An audio input terminal lets you mix in material from any audio device for custom sampling. The CBX-T3 plugs into the serial port on your Mac or PC. (#6546, Yamaha)

Minimum requirements: 4MB RAM under System 7.

How to Order

- Call 1-800-218-0009 anywhere in the USA or Canada. Call (206) 883-8312 for international orders.
- Fax your order to 1-800-881-3090.
- For electronic orders, use Compuserve (76635,660), GEnie (MACSPLACE), or America Online (MacsPlace).
- Mac's Place is open from 6 a.m. to 10 p.m. M-F Pacific Time, and 7 a.m. to 6 p.m. on Sat., 8 a.m. to 5 p.m. on Sun.
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- VISA, MasterCard, American Express, OPTIMA, Discover Card, checks, and P.O.s gladly accepted. Your credit card is never charged until your product ships.
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- Our $3 shipping charge includes insurance at no extra charge.
- When a partial order is shipped, we pay freight on additional shipments.
- Many products carry a money back gurarantee. Defective software is replaced immediately with like items. Defective hardware items repaired or replaced at our discretion. We reserve the right to revoke money back guarantee privileges.

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- Call 206-883-8312 for our international sales line.
- We ship throughout the free world via Airborne Express International.
- International orders will be charged full shipping rates.

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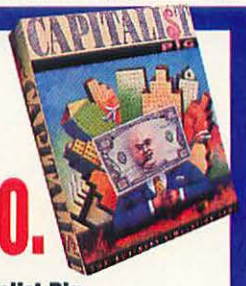
$30.



Capitalist Pig.

Build and run your own business under authentic economic conditions in this exciting simulation. Experience the challenge of business, scandals, fires, terrorists, and more, as you battle for billions or bankruptcy. Packed with sound, animation, and fun, Capitalist Pig is a must-have game. You never knew business could be so much fun! (4640, Pluma)

Minimum requirements: Mac Plus, System 6.0.

$85.

Power Pak 415

"The best case I have ever seen," says *MacUser*. The Power Pak is a rugged equipment carry case with the organization of a briefcase and the room of a travel bag. A padded front pocket has 16 divisions to hold diskettes, a calculator, datebook, checkbook, pen, and other loose items. Unzipping the bag doubles its capacity. The leather hand grip and wide shoulder strap keep travel comfortable. (#5589, Tenba)

$104. Power Pak 416 Carrying Case (#6155)

Quantum

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Unformatted Capacity	Access	Internal	External
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120mb	17ms	$319	$419
160mb	17ms	$459	$559

LPS SERIES
3.5" LOW PROFILE

Unformatted Capacity	Access	Internal	External
120mb	10ms	$269	$329
240mb	10ms	$319	$379
525mb	10ms	$829	$889

ELS SERIES
3.5" LOW PROFILE/POWER

Unformatted Capacity	Access	Internal	External
42mb	19ms	$169	$229
85mb	17ms	$189	$249
127mb	17ms	$215	$275
170mb	17ms	$239	$299

PRODRIVE SERIES
3.5" HALF HEIGHT

Unformatted Capacity	Access	Internal	External
425mb	9ms	$685	$735
700mb	10ms	$1075	$1135
1.0GIG	10ms	$1119	$1179
1.2GIG	10ms	$1249	$1309

GO•Drives have 32k cache, low power consumption, MTBF of 150,000 hours, and ONE Year Warranty. ELS drives have 32k cache, low power consumption, MTBF of 250,000 hours and TWO Year Warranty. LPS drives have 64k-256k cache, MTBF of 250,000 hours, and TWO Year Warranty. PRO drives have 256k cache, MTBF of 350,000 hours, and TWO Year Warranty.

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BUNDLED WITH RETROSPECT V.2.0 BACKUP SOFTWARE

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mb	Teac MT2ST/N50	Analog	$429	$449
mb	Teac MT2ST/F50	Analog	$629	$649
GIG	Archive Python	DAT, DDS	$979	$999
GIG	Archive Turbo DAT	DAT, DDS-DC	$1329	$1349
GIG	HP 35470A	DAT, DDS	$1209	$1229
GIG	HP 35480A	DAT, DDS-DC	$1349	$1369

RetroSpect v.2.0 Backup Software, ONE Tape, ONE Yr Warranty

ClubMac OPTICAL Drives

Sharp Internal Optical is perfect for the Mac IIvx, IIvi, Centris 650, Performa 600 & C900/950.

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Epson	128mb	3.5" Half Ht	45ms	$939	$969
Teac	128mb	3.5" Half Ht	45ms	$939	$969
Sharp	594/652MB	5.25" Half Ht	40ms	$2069	$2099
Ricoh	594/652mb	5.25" Full Ht	28ms		$2999
128mb / 600mb Cartridge					$39 / 95

All ClubMac Opticals include ONE cartridge and ONE Year Warranty.

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ClubMac 88c Int $525
ClubMac 88c Dual $999

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ClubMac 88mb Dual $849

44MB REMOVABLES
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ClubMac 44mb Int $348
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CDR-84 Internal	$599	$679
CDR-38 Portable	$479	$559

CD BUNDLE-OVER $800 VALUE
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Silentwriter 97fx	$1479*

*After MFG $250 rebate, ends 6/30/93

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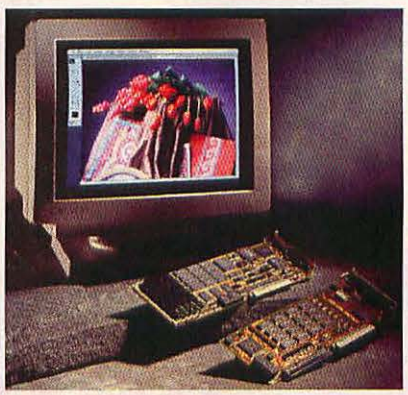

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PC Display/19	$2029
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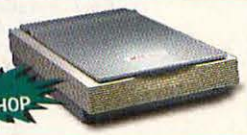

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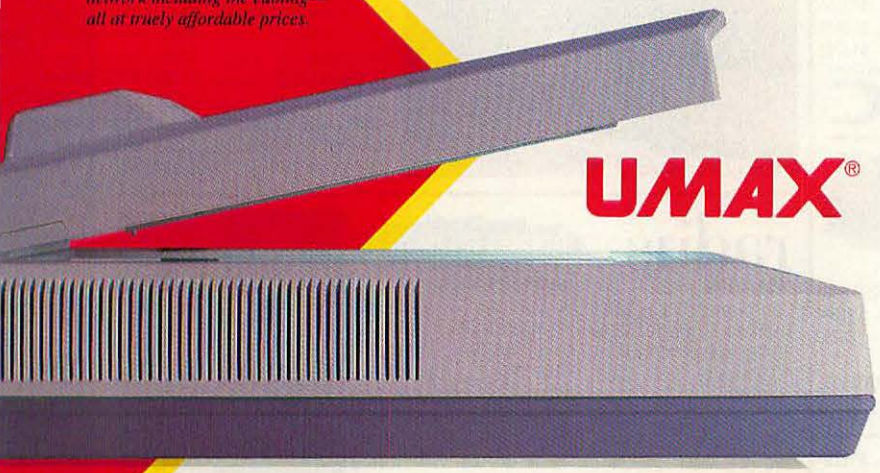

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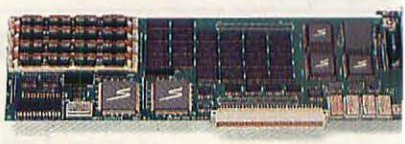

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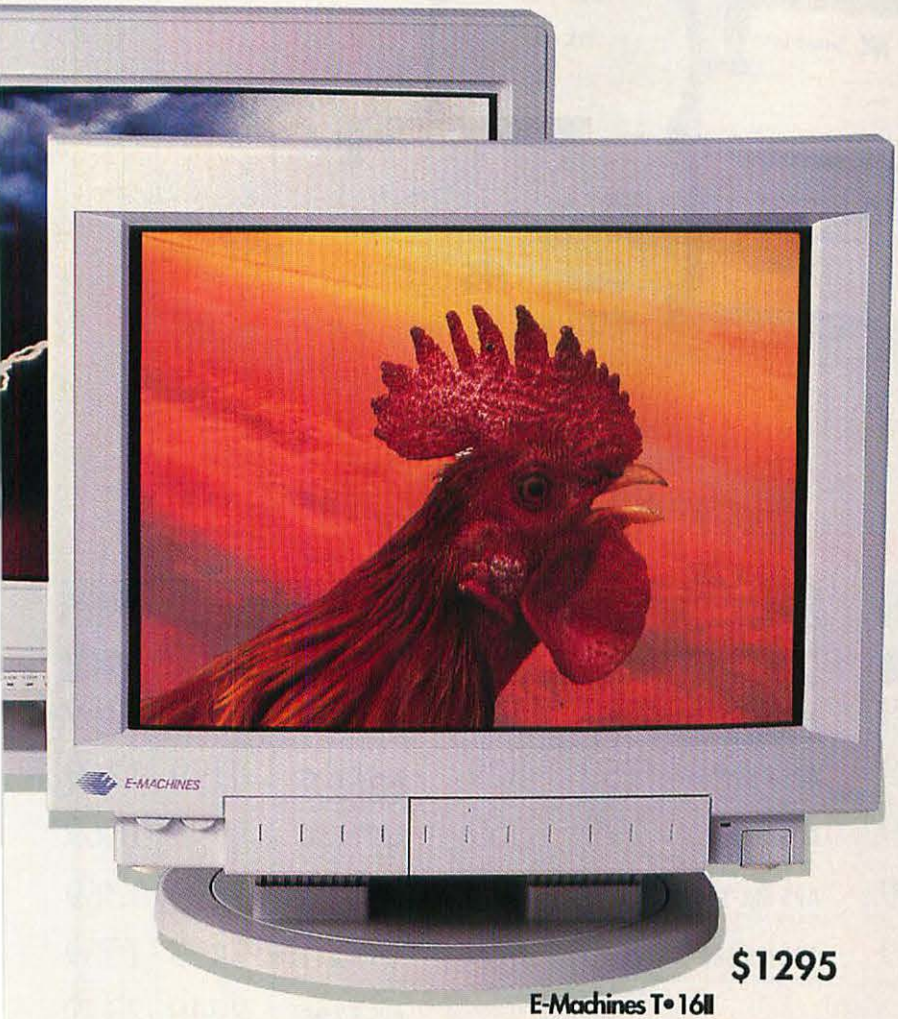

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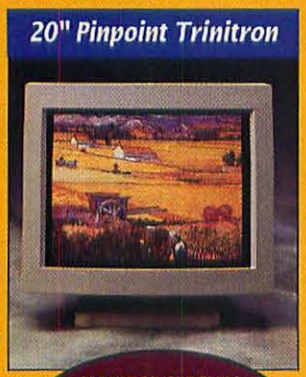

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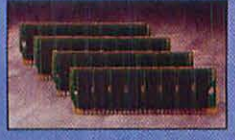

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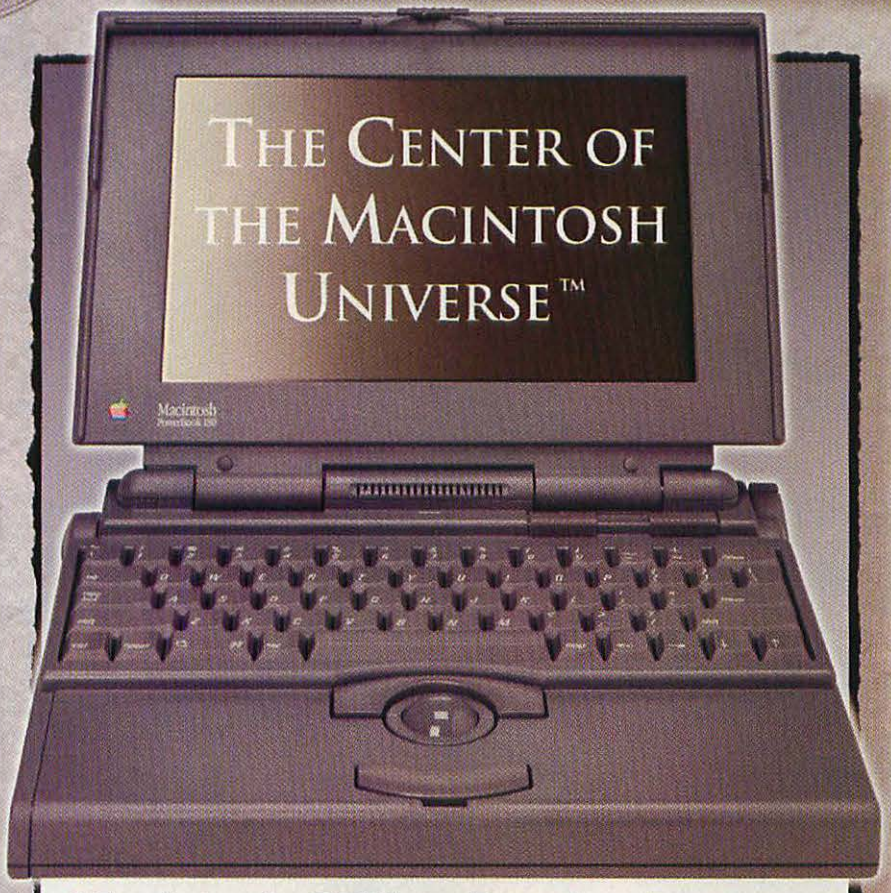

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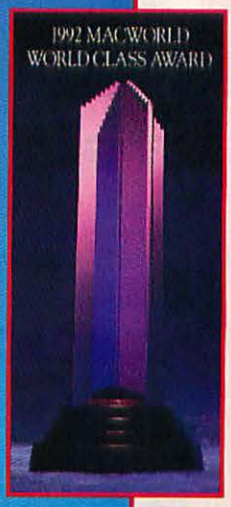

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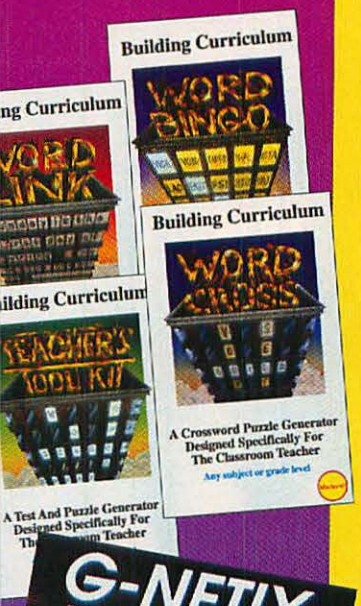

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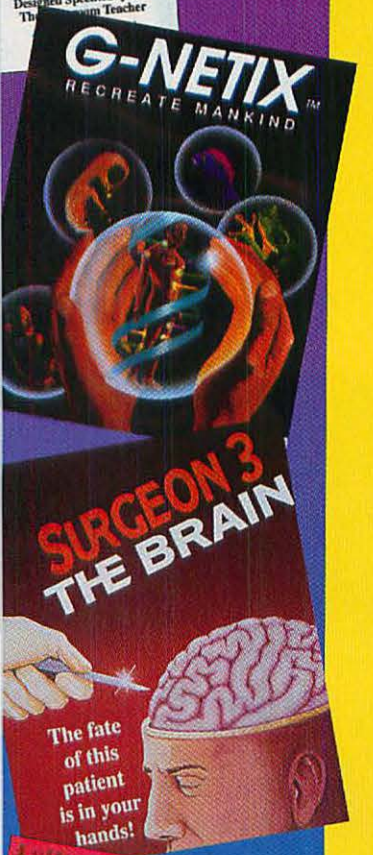

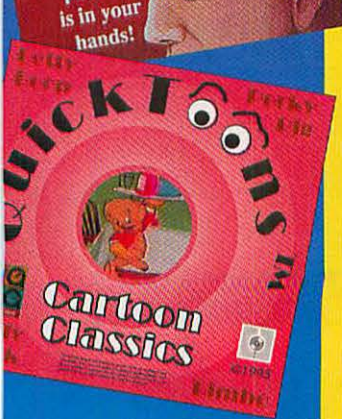

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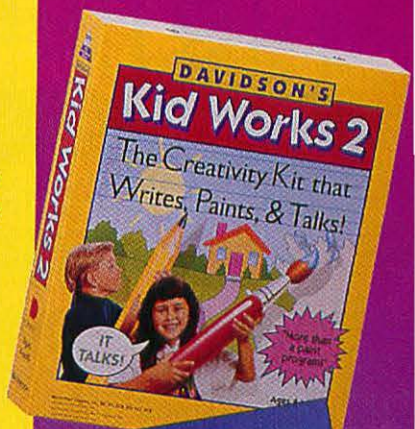

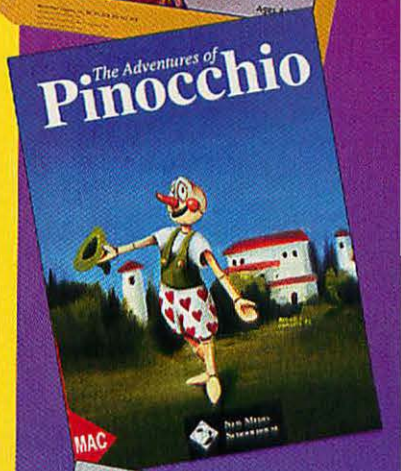

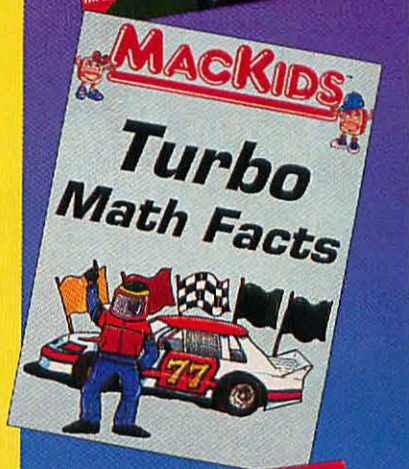

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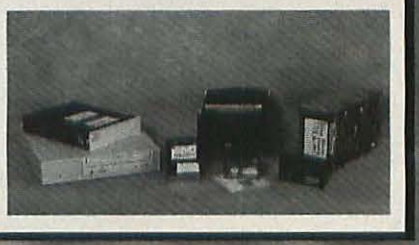

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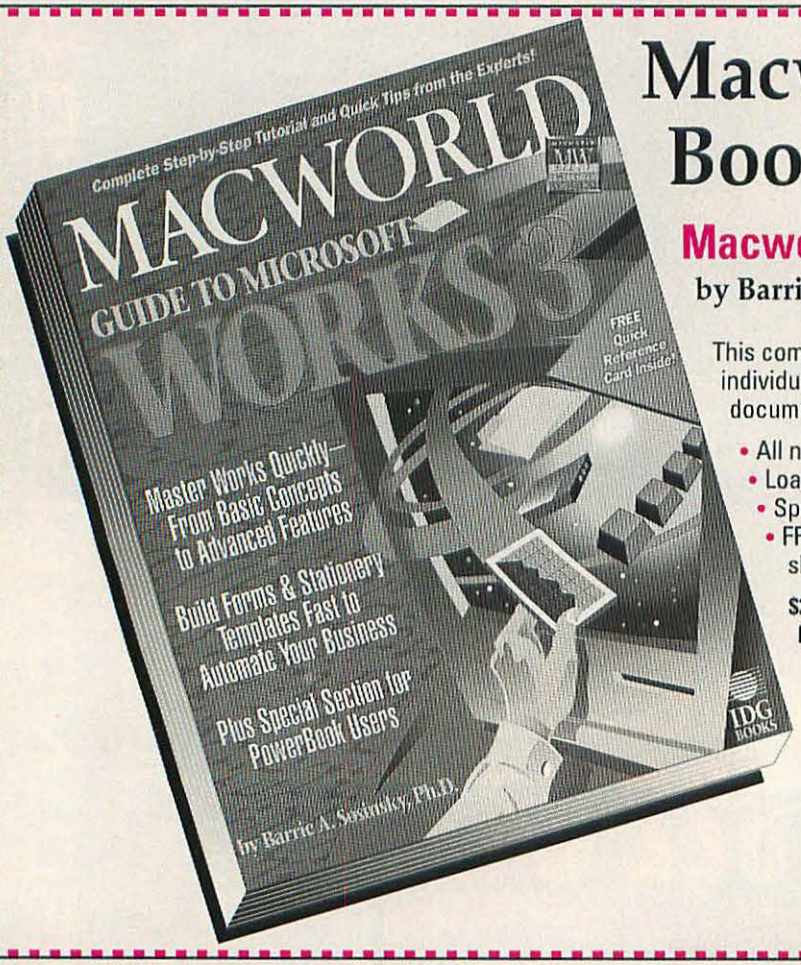

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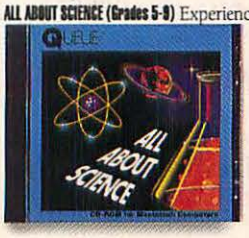

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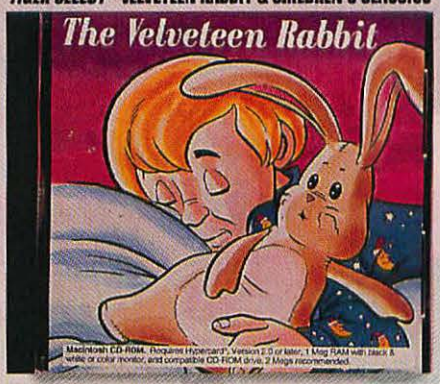

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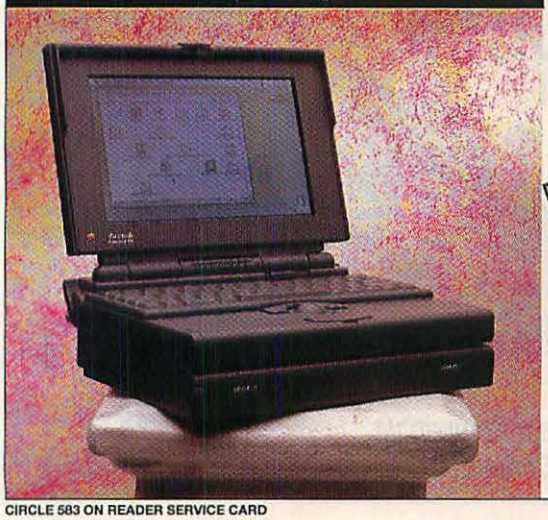

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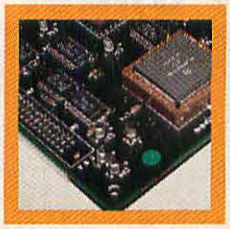

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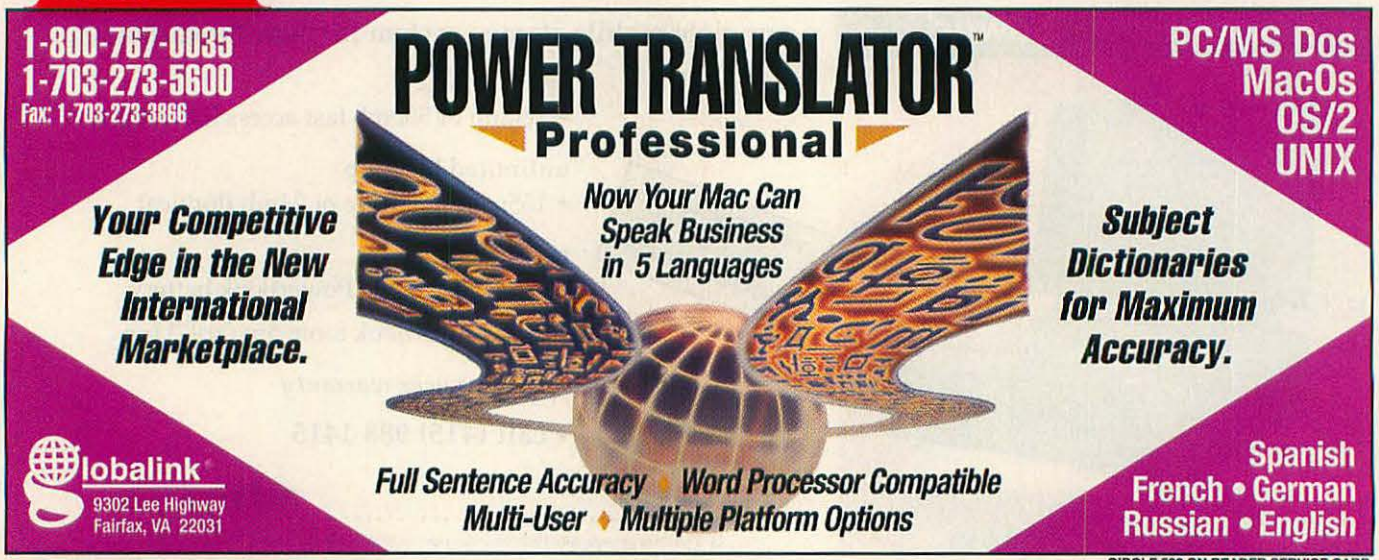

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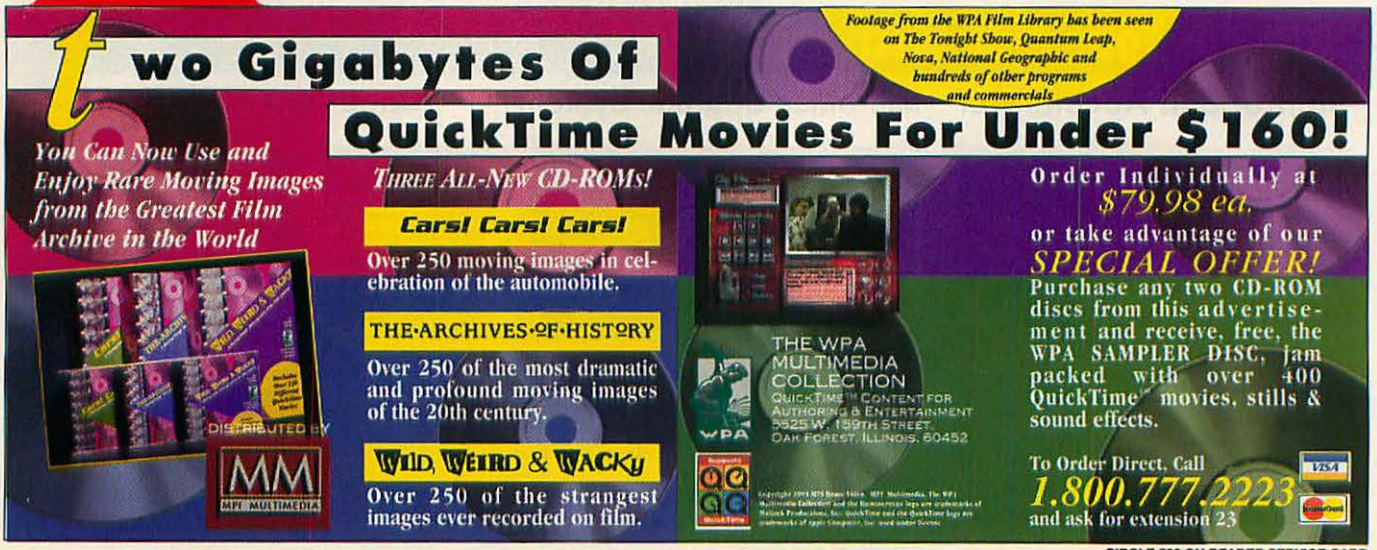

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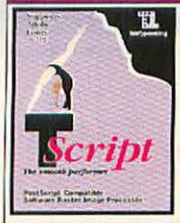

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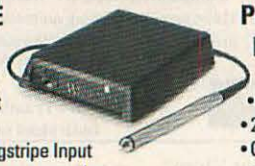

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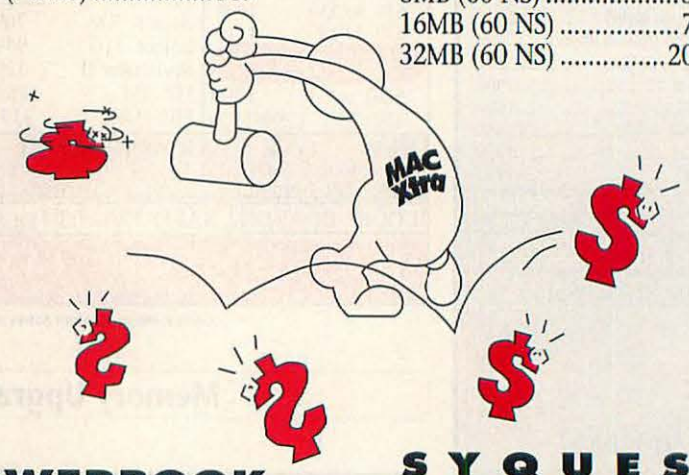

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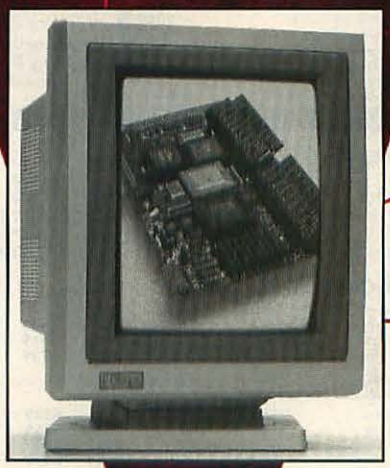

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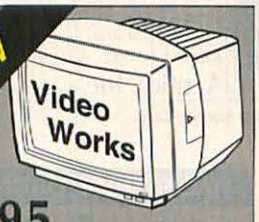

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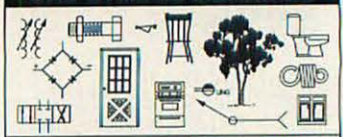

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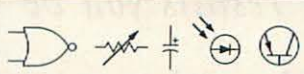

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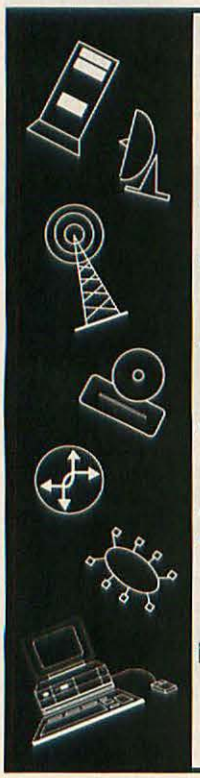

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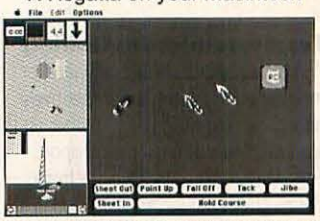

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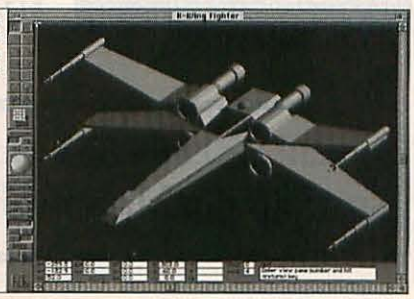

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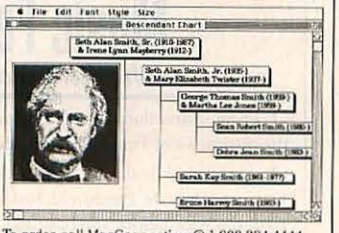

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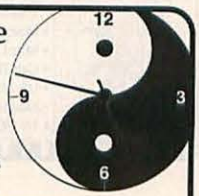

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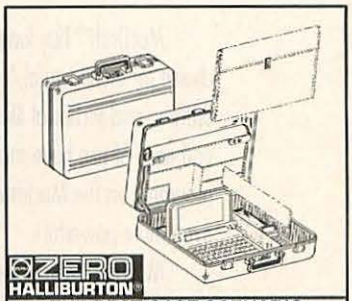

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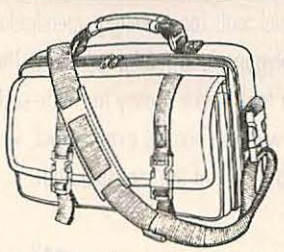

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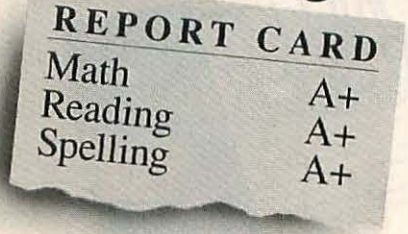

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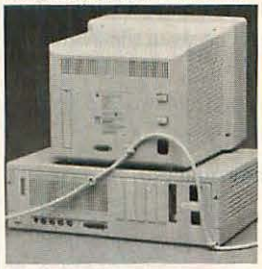

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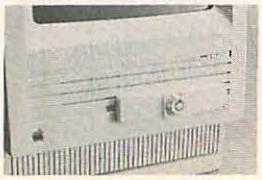

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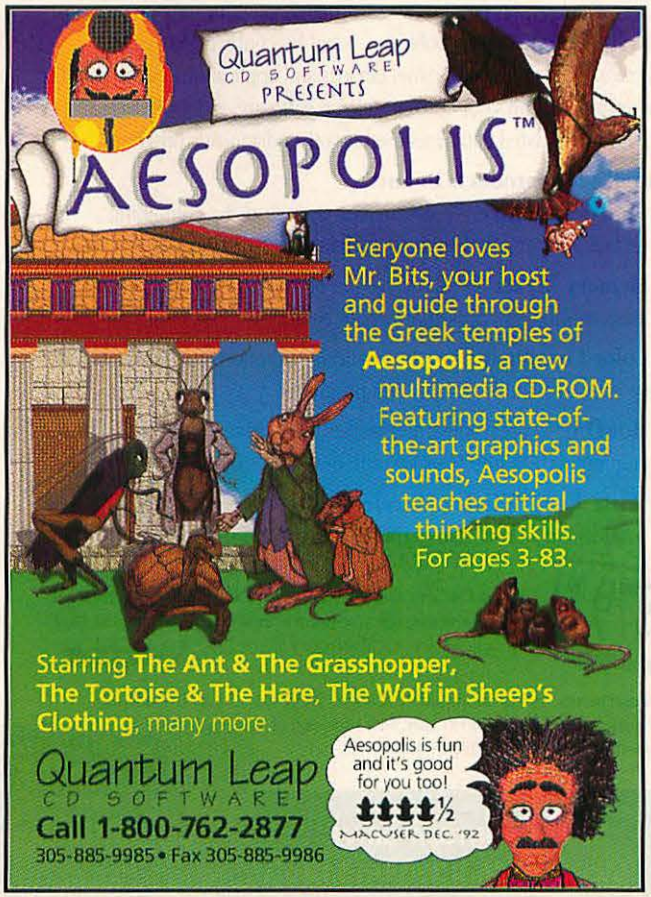

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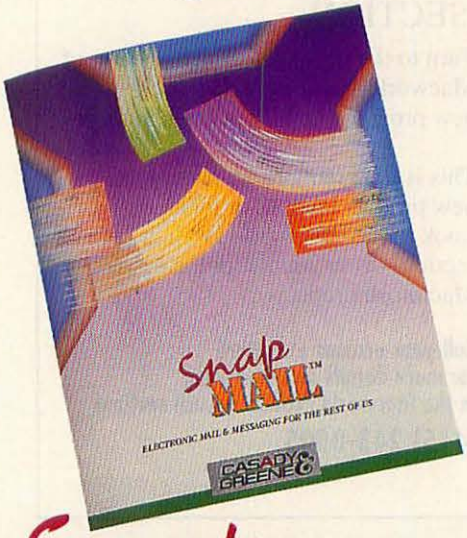

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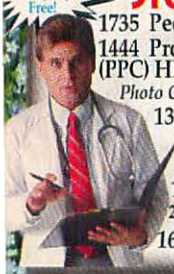

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Eleven Simple Things You Can Do to Save IBM

BY GUY KAWASAKI

IBM IS IN TROUBLE: SALES ARE down, red ink and blood are flowing through its halls, and no one wanted the CEO job after John Akers "resigned." It's time to wipe the silicon-eating grins off our faces and help the Inferior But Marketable, Intimidated By Macintosh, and Incredibly Boring Machine Corporation. Otherwise, we face a world dominated by the arrogance of Apple and the intimidation of Microsoft. So here are 11 things you can do to save the world's (formerly) most profitable corporation from ignominy.

1. Encourage John Sculley to replace Louis Gerstner, Jr., as chairman of IBM. Corporate America uttered a collective "Huh?" when IBM announced the hiring of Gerstner, former chairman and CEO of RJR Nabisco, the cigarette (Camels) and consumer products (Oreo cookies) holding company. (In fact, this choice makes some sense: hire someone who headed a company whose goal appears to be getting people addicted to something that might kill them. It fits right in with IBM's past strategy.) Sculley would do a much better job; at least he knows the difference between a Newton and a Fig Newton. I'm not sure who would sit next to Hillary Rodham Clinton at press conferences, because Sculley would be a lot busier at International Biscuit Machine than he is at Apple.

2. Get Richard Hackborn to be the president and chief operating officer of IBM. Who is Richard Hackborn? He is an executive vice president at Hewlett-Packard. Specifically, he runs HP's Boise, Idaho–based printer business. This renegade division exemplifies how to run a large, high-technology business: decentralized, independent, and profitable. It accounts for 40 percent of HP's income before interest and taxes. What could be a better model for the new IBM?

3. Buy a Lexmark printer. Lexmark is a company that IBM spun off. Lexmark produces laser printers. If its sales and profits increase, that will show IBM that breaking up its behemoth, Stalinist structure is the way to cope with the nanosecond nineties.

4. Get the Apple board to replace John Sculley with an executive from Nabisco. I can see it now: Joe Camel as a software agent. Another possibility for Sculley's replacement is the brother or sister of an Apple executive who once used a Macintosh. Using IBM's recruiting standards, that's a sufficient qualification to run Apple; until recently Gerstner's brother was a high-ranking IBM employee, and Gerstner supposedly used an IBM PC once—probably to calculate the legal costs of all the lung cancer lawsuits.

5. Buy up all the birth-control devices in Washington state. Marriage alone might defocus Young William from running Microsoft as well as he does, but a baby would certainly do the trick. Since most Mac owners don't have sex, you can use the condoms to prevent your extra PowerBook batteries from hitting metal objects in your briefcase and shorting out. Today-brand sponges make excellent shock-absorbing feet for Quadras, and Norplants make good plant-food spikes.

6. Send Bill Gates an MCI Mail message with your company's technical secrets, and then tip off the police. Gordon Eubanks, CEO of Symantec, is in trouble because someone he hired from Borland allegedly sent him technical secrets before leaving Borland. Maybe you could get Bill Gates in similar trouble. Bill and Gordon could share a cell—imagine the conversations: "Microsoft BASIC is the best language." "No way, you geek! Think C is."

7. Build a basketball court for Steve Capps. Steve is a coauthor of the Finder, and he's the de facto engineering stud of the Newton project. It's in IBM's best interest that the market not change, so IBM can catch up. One way to do this is to slow down projects like Newton. Steve's favorite pastime? It's a toss-up between basketball and programming, and his house doesn't have a basketball court.

8. Send Stewart Alsop a pizza and Esther Dyson a plane ticket to Russia. Stewart is the editor-in-chief of *InfoWorld*. Esther is an industry analyst. They are two of the sharpest and most critical thinkers in the personal-computer business. IBM needs breathing room, so we need to reduce criticism of its efforts in the press. The most effective way to defocus Stewart is to send him something to eat. Esther is fascinated by the role high technology can play in rejuvenating Russian society. The most effective way to defocus her is to give her a trip to Russia.

9. Tell Apple you want more models of Macintosh. The Akihabara Syndrome aside, we've got to help IBM. What better way to create more confusion in the market than with more Mac models? We need a Quadra 925, an LC II.V, and a PowerBook 175. If things get really bad for IBM, we could tell Apple to produce more modems.

10. Send Michael Dell, CEO of Dell Computer Corporation, to Harvard to get an M.B.A. What does Young Michael (age 28) know? He's only built up a $2 billion business that provides support and sells computers at reasonable prices. He needs an M.B.A. He needs a B.A., as well, because he dropped out of school at age 19. By the time he finishes the degrees, maybe IBM could rebound.

11. Buy an IBM PC. I didn't say saving IBM would be easy or painless. What can you do after you buy one? I asked around for ideas, and the best suggestion I got was to put them in toilet tanks as "displacement devices" to reduce the amount of water flushed. (Admittedly, the people I asked were hardly unbiased.) What's good for IBM is good for the earth. m

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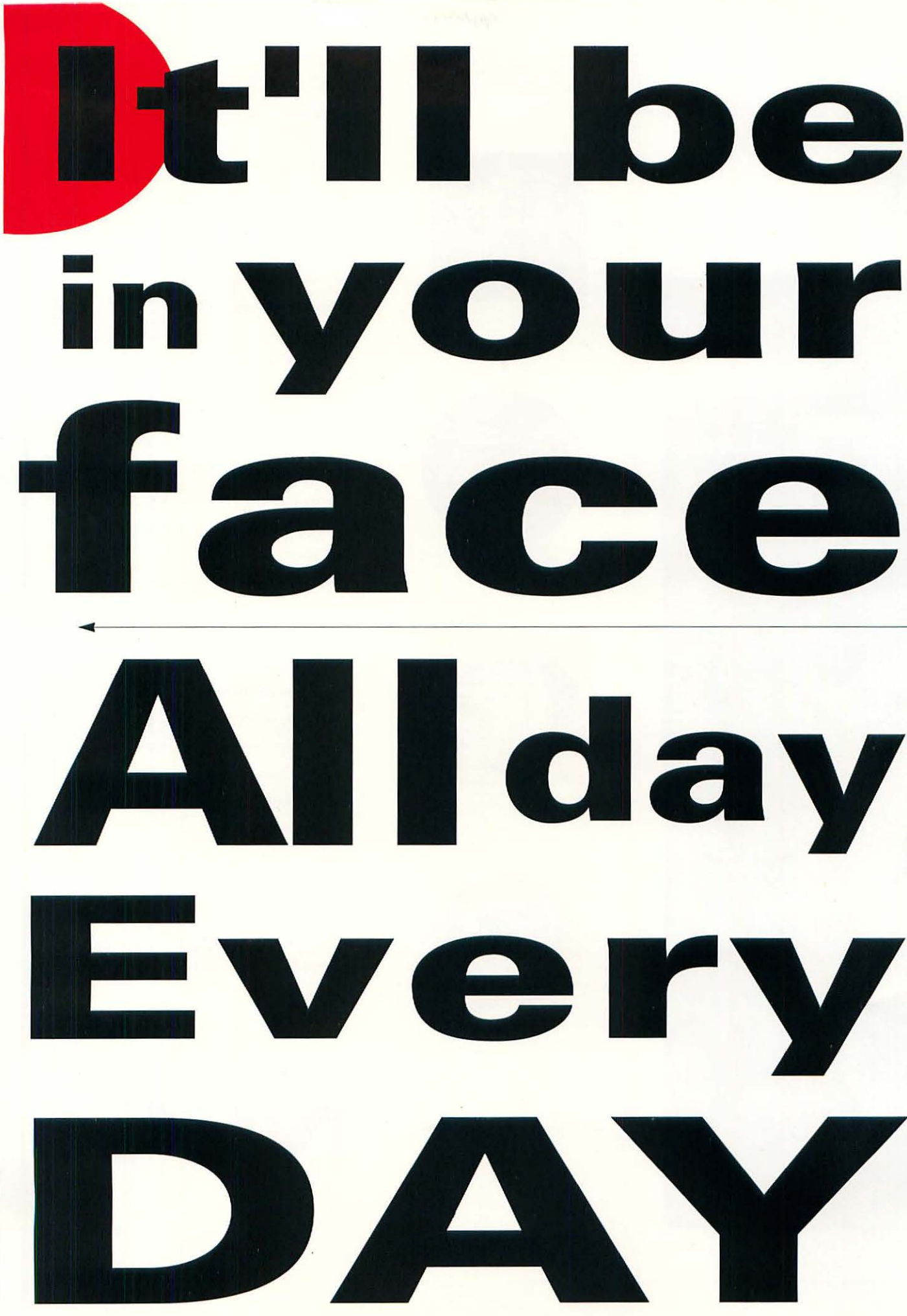
GUY KAWASAKI's views are his own and only sporadically represent those of *Macworld*. His latest book is *The Computer Curmudgeon* (Hayden Books, 1992). He has investments in After Hours Software, Objective Software, Global Village Communications, Bookmaker Corporation, and others.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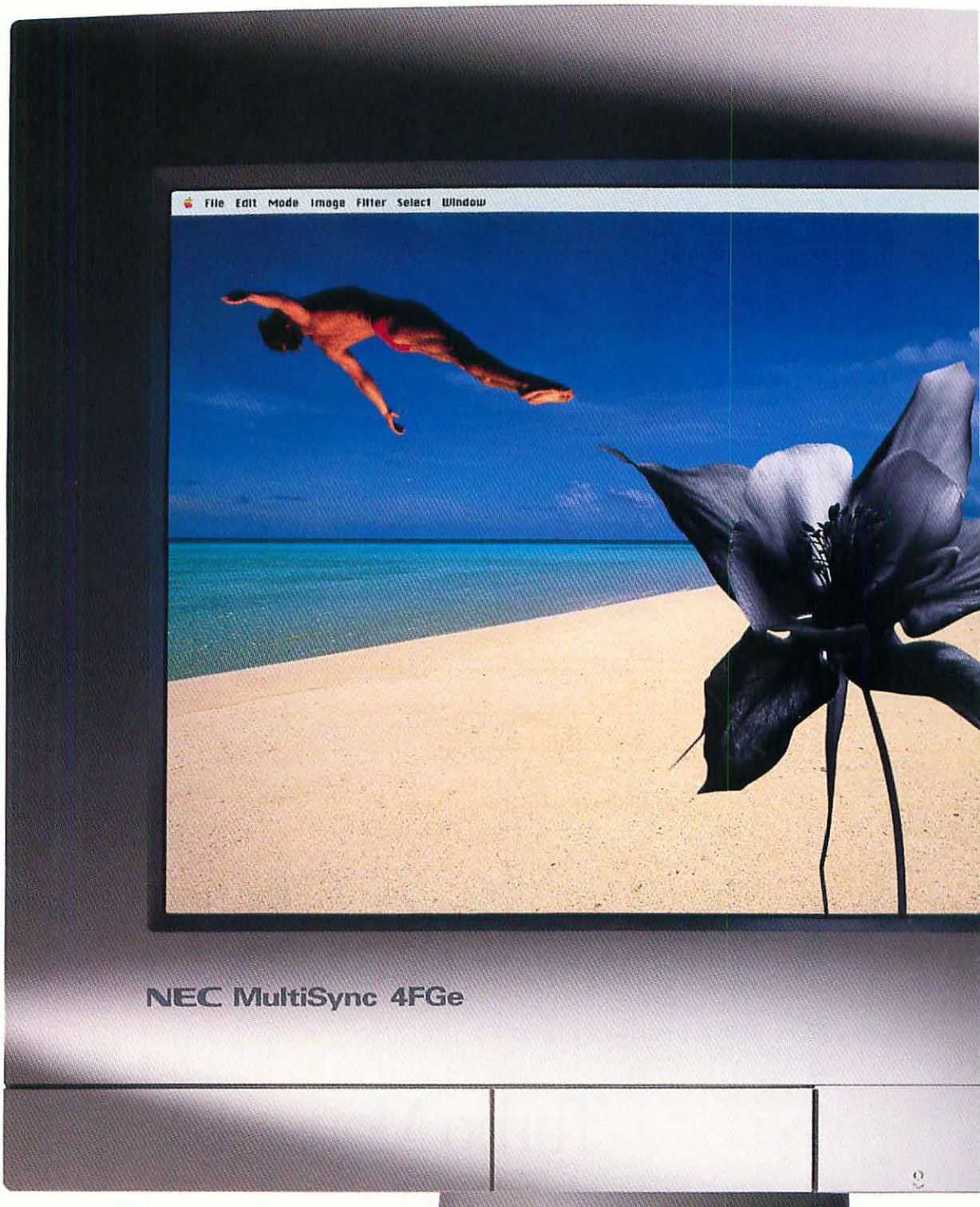

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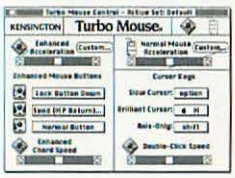

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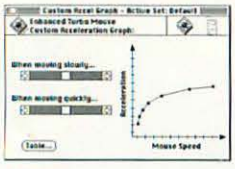

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